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No. I. of Vol. I., 1921. **No. 5079. Vol. CC.**

LONDON, SATURDAY, JANUARY 1, 1921.

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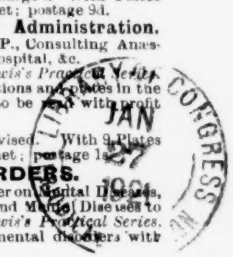

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CONTENTS.

THE WHOLE OF THE LITERARY MATTER IN THE LANCET IS COPYRIGHT.

THE HUXLEY LECTURE on Recent Advances in Science in their Relation to Practical Medicine and the Nutritional Requirements of the Body. Delivered at Charing Cross Hospital Medical School on Nov. 24th, 1920. By F. GOWLAND HOPKINS, M.B., D.Sc., F.R.C.P.Lond., F.R.S., Professor of Bio-Chemistry, University of Cambridge..... 1

AN ADDRESS on the Psychology of Anæsthesia. Read before the Section of Anæsthetics of the Royal Society of Medicine, by DUDLEY WILMOT BUXTON, M.D., Consulting Anæsthetist to University College Hospital 7

ORIGINAL ARTICLES.

Oral Sepsis, with Special Reference to Chronic Dental Apical Infection. By W. BERTRAM WATSON, M.D.—(*Illustrated*)..... 11

Experiments with the Flocculation Test (Sachs-Georgi) for Syphilis. By W. R. LOGAN, M.D. Edin., F.R.C.P. Edin., Clinical Pathologist, Royal Infirmary, Edinburgh 14

A Case of Enteric Fever due to the B. Enteritidis of Gaertner. By A. B. ROSHER, M.R.C.S., L.R.C.P. D.P.H., and G. SELBY WILSON, M.D., M.R.C.P., D.P.H. — (*Illustrated*)..... 16

Pseudo-Coxalgia: Osteo-Chondritis Deformans Juvenilis. By H. A. T. FAIRBANK, D.S.O., O.B.E., M.S. Lond., F.R.C.S. Eng., Senior Orthopædic Surgeon to King's College Hospital. — (*Illustrated*)..... 20

A Note on Spirochætes in the Ætiology of Certain Paralyses. By G. SCHUSTER, M.D. —(*Illustrated*)..... 21

Observations on the Use of Citrated Media. By H. C. BROWN, C.I.E., M.B., B.Ch., Major, I.M.S. — (*Illustrated*) 22

Some Problems in Marine Hygiene. With Special Reference to Merchant Ships. By Surgeon Vice-Admiral Sir ROBERT HILL, K.C.M.G., C.B., C.V.O., Medical Director-General of the Royal Navy. I. Ventilation and Accommodation in Ships..... 54

MEDICAL SOCIETIES.

Royal Society of Medicine: War Section..... 24
Section of Electro-therapeutics..... 24
Society of M.O.H..... 25
Royal Society of Tropical Medicine and Hygiene..... 26
Liverpool Medical Institution 27

REVIEWS AND NOTICES OF BOOKS

Women as Army Surgeons. By Flora Murray, C.B.E., M.D.. 28
Text-book of Tracheo-Bronchoscopy. By Dr. M. Mann..... 28
Accessory Sinuses of the Nose. By Ross Hall Skillern, M.D.. 28
Lectures on Tropical Ophthalmology. By R. H. Elliot, M.D. 28
Formulaire des Milieux de Culture en Micro-biologie. By Deribere Desgardes..... 28
Roentgenographical Technique. By I. Seth Hirsch, M.D..... 29
The Radiography of the Chest. Vol. I. Pulmonary Tuberculosis. By Walker Overend, M.A., M.D., B.Sc..... 29
Manuel d'Urétroscopie. By Robert Henry and André Demonchy..... 29
Early Embryology of the Chick. By Bradley M. Patten..... 29
Atlas of the Sensory Cutaneous Nerves. By William Ibbotson, M.R.C.S., L.R.C.P..... 29
Psychology of the Special Senses. By Arthur F. Hurst, M.A., M.D..... 29
Autobiography of Sir Charles A. Cameron..... 30
Normal Histology. Twelfth edition. By George A. Piersol, M.D., Sc.D..... 30
Handbook of Mechanical Dentistry. By J. L. Dudley Buxton 30
The Care of Children. Fourth edition. By Robert J. Blackham, C.B., D.S.O., M.D., Colonel, late A.M.S..... 30
A Thought Book on the Socratic Method. Edited by T. Sharper Knowlson..... 30
Griffin's Centenary Volume, 1920..... 31
Inorganic Chemistry. By James Walker, LL.D., F.R.S. Eleventh edition..... 31
Text-book of Chemistry. By R. A. Witthaus, A.M. Seventh edition..... 31
Intermediate Text-book of Chemistry. By Alexander Smith..... 31
Elementary Practical Chemistry. By J. E. Myers, D.Sc., and J. B. Firth, M.Sc. Second edition..... 31
Qualitative Chemical Analysis. By Henry W. Schimpf, Ph.G., M.D. Third edition..... 31
Applied Chemistry. By C. Kennet H. Tinkler, D.Sc., F.I.C., and Helen Masters, B.Sc. Vol. I..... 31
Practical Chemistry. By P. A. Ellis Richards. Third edition 31
Journal of Pathology and Bacteriology..... 31

NEW INVENTIONS.

Instruments for the Relief of Deafness.—(*Illustrated*)..... 32
A Simple Tray (Mr. F. E. Gunter).—(*Illustrated*)..... 32

LEADING ARTICLES.

THE NEW YEAR..... 33
INSANITY AND RESPONSIBILITY 33
OCCUPATIONAL HYGIENE AND THE SCHOOL MEDICAL SERVICE..... 34
THE FINANCIAL POSITION OF THE HOSPITALS..... 35
A PRIZE IN OPHTHALMOLOGY 35

ANNOTATIONS.

In Memory of Huxley..... 36
Chronic Gastric Disorders..... 36
Silicosis on the Rand..... 37
Effective X Ray Therapeutics 37
Gonococcal Endocarditis in a Child..... 37
The Ear as Prototype of the Torpedo..... 38
Indigenous Malignant Tertian Malaria..... 38
Fat-Metabolism of Infants and Young Children..... 39
"Snow-Blindness"..... 39
Psychoneurosis, Sympathetic and Endocrin..... 40
The Size of Red Blood Corpuscles..... 40
Dermatitis Dysmenorrhœica.. 40
Beethoven's Diseases..... 41

SPECIAL ARTICLES.

Financial Position of Hospitals 41
Tuberculosis..... 42
Medicine and the Law..... 43
Paris..... 44
Ireland..... 45
Urban Vital Statistics..... 45
The Horsley Memorial..... 46

CORRESPONDENCE.

The Future of Poor-law Infirmaries (Dr. J. C. Muir')..... 46
Criminology (Sir Wilmot Herringham)..... 47
Synopsis of Physiology (Dr. Ffrangcon Roberts)..... 47
The Organisation of the Medical Profession (Dr. N. Howard Mummery)..... 47
Spiritualism and the New Psychology (Prof. Leonard Hill) 48
The X Ray Treatment of Ringworm: A Warning (Dr. James Neal)..... 48

THE SERVICES.

Army Medical Service..... 45
Royal Army Medical Corps..... 45
Indian Medical Service..... 45

PARLIAMENTARY INTELLIGENCE.

Notes on Current Topics..... 48
House of Commons: Substitutes for Salvarsan.—Dental Bill.—Ex-Service Men in Asylums.—Medical Appeal Tribunal for Wales.—Calves Used for Lymph Production. —Public Vaccination Statistics.—Food Value of Milk.—Free Passages for Indian Medical Service.—Committee on Smoke Abatement.—Military Cases of Small-pox. Surplus Hospital Accommodation. — Washington Conference and Maternity.—Divisional and Whole-time Medical Officers..... 48

MEDICAL NEWS.

University of Cambridge: Pass-list..... 50
University of London: Pass-list..... 50
University of Manchester: Pass-list..... 50
University of St. Andrews: Pass-list..... 50
Medical Officers of Schools Association..... 48
Cambridge and Vienna..... 50
London (Royal Free Hospital) School of Medicine for Women..... 50
National Association for the Prevention of Infant Mortality..... 51
Medical Magistrate..... 51
Medical Coroner..... 51
Instruction in Hospital Administration..... 51
The People's League of Health 51
Central Midwives Board..... 51
Fees of Doctors Called in by Midwives..... 51
The late Dr. G. C. Grant..... 51
Medico-Legal Society..... 52
Society for the Prevention of Venereal Disease..... 52
Royal Medical Benevolent Fund..... 52
Outbreak of Small-pox in Aberdeenshire..... 52
Health Scheme for the County of Aberdeen..... 52
Donations and Bequests..... 52
Manchester University Degree Day..... 52
Aberystwyth District Medical Officership..... 52
Cardiff Medical Society..... 52

NOTES, SHORT COMMENTS, &c.

The Nature of Animal Light... 56
Public Health in Egypt..... 57
The "Bee World"..... 58
The Girls' School Year Book 58
A Radiant Heat Conserver..... 58
"How to Live for More than One Hundred Years"..... 58
Medical Practice by Foreigners in Spain..... 58
Year Book of Pharmacy..... 58

Books, &c., received..... 53
Appointments..... 53
Vacancies..... 53
Births, Marriages, and Deaths..... 53
Medical Diary..... 54
Acknowledgments of Communications received..... 58

Diseases of the Newborn

By **Dr. AUGUST RITTER VON REUSS**, Director of the Department for the Newborn at the first University Women's Clinic in Vienna. Translation revised by JOHN D. ROLLESTON, M.D., B.Ch., M.A. Oxon. With 90 Illustrations. Royal 8vo. Pp. xii. + 626. **52s 6d. net**, postage 1s. 6d. [*Just Ready.*

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IN THEIR RELATION TO PRACTICAL MEDICINE AND THE NUTRITIONAL REQUIREMENTS OF THE BODY.

Delivered at Charing Cross Hospital Medical School (University of London), on Nov. 24th, 1920.

BY F. GOWLAND HOPKINS, M.B., D.SC., F.R.C.P. LOND., F.R.S.,
PROFESSOR OF BIO-CHEMISTRY, UNIVERSITY OF CAMBRIDGE.

No scientific worker, when invited by the staff of this great medical school to deliver a Huxley lecture, can fail in gratitude for the honour done to him. Nor, on the other hand, can he avoid a deep sense of responsibility. These occasions must be always significant, and till now each has been greatly served. The school has hitherto taken care that the memory of its great pupil should be recalled by lecturers, who have themselves reached high distinction. To follow them calls for courage enough. For myself, while offering my sincerest thanks for the opportunity put into my hands, I will beg for leniency, should comparisons be made.

I am to deal with human nutrition; but from a special standpoint and with special aims. I believe that recent acquirements in knowledge are changing the angle from which the nutritional needs of the human body ought to be viewed. That new criteria are becoming available and must be employed is the theme of this lecture. The acquirement of this newer knowledge began almost simultaneouly with the present century, but in its more significant, or, one should rather say, its more convincing aspects, it is of recent date. The latest developments were due almost entirely to investigators who have written in English. If they can be said to have yet affected practice it is only in countries where the English language is written and spoken.

I wish to put before you a personal appraisement of the importance of this newer knowledge, hoping to convince you that it has—as a subject of a Huxley lecture should, by definition, have—real relations with practical medicine.

As the last century closed the facts of nutrition were coming to be viewed more and more exclusively from the standpoint of Energetics. The criterion of an efficient dietary was apparently destined to be its caloric value, and, with one qualification, which seemed then to be lessening in significance, its caloric value alone. The chemical standpoint, in so far as it envisaged details, seemed to be losing its practical importance. Although the knowledge which was to correct these views, which, as I hope to show, were far too limited and exclusive, began to accumulate 20 years ago, the doctrine of the "eighteen-nineties" has continued to hold its ground, and is still sufficient for many.

Developments of Calorimetry.

Those years saw a remarkable development in the technique of human calorimetry. The accuracy with which the energy exchanges in the body came to be measured gave rise in the minds of all students of nutrition to a sense of real accomplishment, and to a feeling that, in addition to certain theoretical conclusions of great interest, calorimetry was making available, perhaps for the first time, information of a really quantitative kind to serve in practical guidance. The vague standards based upon statistical studies of the habits of communities could at last, it was felt, be checked, and if need be corrected, by data which were in the truest sense scientific. What, in terms of energy, are the basal requirements of the body? What the caloric equivalent of various forms of mechanical work? What the efficiency of the human body as a machine? What the relative value of different foodstuffs as sources of muscular energy? All these and kindred questions were being answered or the methods for their future solution made clear as the last century closed. They are, indeed, still being investigated, and with increasing accuracy, chiefly in the country where they were first seriously dealt with. For American workers Graham Lusk, Dubois, Benedict, and others are continuing the work of Atwater and Rosa, and are obtaining quantitative data which can be so controlled as to carry their own inherent proof of striking and even startling accuracy. The investigations are extending into the domain of pathological metabolism, and there I am convinced will have important bearings. I should, indeed, stultify myself if any word in this address gave you the impression that I under-value the results of accurate calorimetry as applied to man. My contention will be not that the data of calorimetry are unimportant, but that they are insufficient. Whatever else we need to know for proper definitions of nutritional requirements, we need always to know what is the call for energy. It would have been well indeed if the importance of such knowledge had been more widely recognised by Governments before the war. In spite of the developments I have mentioned, the war and its very urgent needs for guidance in matters of alimentation found us still with far too little knowledge of the energy requirements of troops in the field and of individuals engaged in various employments. It was as painful for those who had, in any capacity, to give advice to administrators on such matters to realise that scientific information was still sadly lacking in detail as it was surprising (at first) to the officials that scientific men should have any information to give at all! Considering the mass of information that is wanted and the fact that up to now the necessary equipment for such studies is confined to a few centres in America, it is not surprising that the data for complete practical guidance are even yet lacking.

Importance of Chemical Details.

If, however, when the crisis arose, the information available for guidance was insufficient on the side of energy requirements, the advice which could be given was lacking in precision for quite another reason. There was too little knowledge concerning, or, where there was knowledge, there was, for a long time, too little faith in the facts which later are to form the theme of this lecture. It is in my opinion not too much to say that when peace was established if policy had recognised, and could have afforded to apply, the teaching of the facts in question, the nutrition of Central Europe would be in a greatly more satisfactory condition than it is.

You cannot fail to have gathered already that my purpose is to bring to the front the importance of chemical details in the science of nutrition. Only by full consideration of these are adequate criteria made available for dietetics. I may take as my text the following definite and unequivocal statement:—

An animal may receive, digest, absorb, and, in a sense, fully metabolise a diet consisting of all the recognised basal foodstuffs. It may be taking these foodstuffs in quantity sufficient, or more than sufficient, to supply all its needs for energy. And yet its nutrition may be so abnormal that neither growth, nor health, nor life is long maintained. That this statement is one of fact has been brought home to many engaged in experimental studies by the behaviour of hundreds of individual animals. Being true it shows at once that, however useful may be the criterion of energy values in food-supply when other essentials have been first secured, the energy it contains cannot be the sole criterion of a diet. We cannot indeed escape from a full consideration of detail.

It is always a delight and relief to the mind when by the generalisation of knowledge it is enabled to neglect details. This relief is given in many branches of science by the application of the principles of energetics or thermodynamics. The method of thermodynamics, as you are well aware, enables us to make certain quantitative statements concerning physical and chemical phenomena without any kind of reference to the molecular mechanisms which underlie the phenomena. The statements remain true however

much our views may change concerning the mechanism. Defining the nutritional needs of the body in terms of calories is an application of the thermodynamic method to metabolism. In a very limited sense, however. The true thermodynamic of metabolism calls for consideration of each tissue separately. Statements in terms of calories refer to a balance of events in the body, and refer alone to the energy liberated by combustion of the foodstuffs. On fuller analysis we may find that a given tissue utilises the free energy of a foodstuff and not its energy of combustion alone. Such considerations would lead me, however, to stray from my path. I would just like to point out here as noteworthy the fact that physical science in its recent dealings with the atom has returned to the study of mechanism, and that what we may call the higher chemistry, after long preoccupation with thermodynamical studies, has come back with fresh interest to considerations of molecular structure.

Rubner's Law of Isodynamic Equivalence.

I am on the present occasion more anxious to convince you of the real and significant difference which exists between the outlook now opening and the narrower one which sufficed till recently, than to present at any length the more technical side of modern studies. I will venture therefore to delay my dealings with the new facts just a little longer in order to show how the older view has, both in theory and practice, been narrowed to the utmost. I will derive my discussion from the teaching of two authorities of the highest standing. I allude to Rubner and to von Pirquet. The one (though no mere theorist) shall supply the doctrine. The other (though far from an empiric) shall illustrate practice.

Rubner, however one may appraise his theoretical teaching, is one who has done more than most to advance the science he professes. He was the first to offer acceptable experimental proof that the principle of the conservation of energy holds in the animal body. A pioneer in calorimetric studies, he rightly saw that the conception of energy changes expanded and corrected certain of the earlier and purely material conceptions concerning life and its maintenance. But he also gradually developed a doctrine in which the energy exchanges of living matter are supposed to give, as it were, a higher and more significant criterion of life than any consideration of material changes could provide. From much of Rubner's teaching one gets, indeed, the impression of a belief that any broad and philosophic view of the meaning of life can only be obscured by attention to the details of material.

In one of his expositions[1] Rubner poses the question: "Material or Energy, which (in nutritional phenomena) is the more decisive?" and straightway answers the question by reference to the law (so named by him) of Isodynamic Equivalence. This involves the principle that any one foodstuff can replace any other so long as the replacement makes no change in the supply of energy. We may place, continues Rubner (I quote almost verbatim) a warm-blooded animal—a dog, for instance—under absolutely constant conditions and nourish it respectively with protein, with fat, or with carbohydrates. Now the chemistry of its nutrition in those three cases is wholly different, and the weight of material which we must administer to maintain the identity of conditions is by no means the same. If, however, we determine by calculation how great is the consumption of energy we shall find it constant in each case. Here is the proof of the Law of Isodynamic Equivalence. So argues Rubner; but unless the above statements are interpreted under strict limitations they are simply not true, and they may be made the basis of false doctrine.

Rubner, for instance, in the same place proceeds to assert "From the Law of Isodynamic Equivalence it follows that the living tissues do not demand any one of the basal foodstuffs in particular, but demand energy alone," a doctrine which on any fair interpretation is false. Permit me, however, to follow the thought of this author a little further. Rubner has maintained certain general propositions concerning living matter which, if true, are certainly of interest. The first is this: Every unit of living matter (a unit which it is not easy to define), is adjusted to expend the same amount of energy in a given time. If in different cases the expenditure seems vastly different it is due to circumstances alone. Make the circumstances the same and the energy expenditure will be the same, whatever the origin of the living unit, whether it be part of a bacillus or of a man. This is one way of stating a theory of life's unity. One need not quarrel with it. It is, however, almost impossible to prove it experimentally, and I doubt if it has any greater value than, say, the statement that there can be no life without phosphorus.

The next proposition takes us further into dogma and further away from the region of experimental proof. It is that when the unit of living matter has expended a certain predetermined quantity of energy it ceases to grow. This, again, if we follow Rubner, is to be taken as a fundamental attribute of living stuff. It follows that the duration of growth and the ultimate size of any animal are both functions of the rate of energy exchange in its tissues. The "tendency to grow" is just as great in the tissues of the young mouse as in those of the young elephant. Consider, however, two units of living matter, one of which is, or is to be, part of the body of a mouse, and the other part of the body of an elephant. From the first their condition, from the standpoint of energetics, is very different. The former, when in utero, is part of a material system (the body of the mother) which, being small, has relatively to its mass a large surface. Because of this relatively large surface energy (heat) is lost to the environment with proportionate rapidity and energy liberation within must be rapid for the maintenance of equilibrium. The latter, the embryonic elephant, is from the first part of a large system, of which the surface in relation to its mass is small. The rate of loss to the environment is therefore in this case proportionately small, and energy expenditure is economical. When mouse and elephant are born their own masses are still proportionately small and large respectively, the units of living matter within them suffer therefore the same differences of condition. In the small mass of the young mouse heat production must be rapid, in the larger mass of the young elephant it is slower, and so throughout their growth. But the doctrine, as you have heard, is that living matter has only a certain limited heritage of energy to expend before growth must cease. In the mouse compulsory extravagance shortens the growth period; in the elephant an equally inevitable economy makes the growth period a long one. Hence, according to Rubner, the ultimate smallness of the mouse and the largeness of the elephant! This is pure dogma. In certain of its aspects there may be truth in the dogma. But there is just as much actual evidence, and in my opinion more inherent probability, for the view that variety in size and form is determined by the specific chemical differences in living matter. Rubner voices his belief that duration of life is also inversely proportional to the rate of energy expenditure; but I must not consider his doctrine any further. He is no vitalist; he is far from postulating a special life force; but in his endeavour to extract some criterion of life other than its material basis he so sublimates the conception of energy—isolating it from and setting it above its material associations—that one feels we are almost brought back to the Archæus of Paracelsus. In parenthesis we may note that another modern mind of a very different type and from a very different standpoint has urged that no significance need be attached to any particular material basis for life. Henri Bergson, who postulates that only two things are necessary for the manifestation of life: (1) an accumulation of energy, and (2) an elastic canalisation of this energy in variable channels at the end of which are free acts, writes as follows:—

"This two-fold result has been obtained in a particular way on our planet. But it might have been obtained by entirely different means. It was not necessary that life should fix its choice mainly upon the carbon of carbonic acid, ... and if the element charac-

[1] Kraft und Stoff im Haushalte der Natur, Leipzig, 1909.

teristic of the substances that supply energy to the organism had been other than carbon the element characteristic of the plastic substances would probably have been radically different from what it is."

All this is as it may be. I have naturally on the present occasion no direct concern with M. Bergson's philosophic views, but it is of some interest to see a philosopher and an experimentalist meet together on the ground that the chemical materials with which life is associated are, relatively speaking, of little significance. This ground is, of course, well worn. It is only that the two modern thinkers I have quoted have reached it by rather special paths. The essential view is old. In one of the most famous of his addresses, delivered in 1868 and well known to you all, Huxley remarks: "I suppose that to many the idea that there is such a thing as physical basis or matter of life may be novel—so widely spread is the conception of life as a something which works through matter, but is independent of it. ....." Huxley, needless to say, controverts that view.

But for the moment I will pass from theory to practice. I will refer to practice which is based upon doctrine such as that of Rubner, but on its sounder parts alone. The reference might come better later; but I want you to have it clearly in mind at the moment that the standpoint of energetics is still dominant in the highest quarters. It is because of this dominance, indeed, that I was led to my choice of subject for this lecture.

Von Pirquet's "Nem" System.

The name of von Pirquet is familiar to you all, and from the scientific standpoint carries with it the very highest respect. It is associated with many important advances in medical practice, but in particular with a remarkable organised system of alimentation. This system —the "Nem" system—involves the rigid application of scientific principles (as appraised by its originator) to the alimentation of individuals, on lines that are ingenious, thorough, and organised for high accuracy. Primarily meant for hospital patients, the system is capable of extension to all classes of the community, and is, indeed, being employed under the direction of Professor Pirquet at this moment in the remarkable task of feeding, on behalf of the Red Cross Organisation, nearly 200,000 children in Vienna. It is based primarily upon calorimetry, aided by calculations which deduce the energy requirements of an individual from his body-weight and his sitting (not his standing) height. In place of the calorie, of which the definition is too abstract for the public, a more objective unit is employed. This unit is the energy contained in 1 c.cm. of milk and is known as a "nem."[2] His or her energy requirements, having been determined on the lines just mentioned, each individual under the system is supplied with a corresponding dietary as evaluated in nems. 10 per cent. of the energy is supplied as protein, but no critical attention is paid to the actual composition of the diet. If, for instance, fat be scarce, as at the present time, then it is replaced with sugar. The practice is based, frankly and courageously, upon energy value as the essential criterion of nutritional efficiency. We have therefore at one of the chief foci of science in Central Europe, at a time when economy in nutrition is a most urgent need, a system which ignores chemical details in diet. Now, if there be anything of significance in the considerations which are to engage your attention this practice must be seriously wrong. I shall return to it again before closing my remarks.

You have now been reminded of the theory and practice which form the point of departure for the newer conceptions. These shall now be appraised.

Impossibility of Replacement of Fundamental Foodstuffs.

During the discussion of Rubner's views it must have been in the minds of most here to ask how that author deals with the protein question. For three-quarters of a century it has been known that protein is one of the specific needs of the body. Protein for repair; fat and carbohydrate for fuel—that has been the short formula which, ever since the times of Liebig, has satisfied the majority of those who deal superficially with nutrition. It is an unsatisfactory formula; but at least it does not ignore the fact that there is one necessary item with specific chemical characters. Needless to say, Rubner has not ignored protein in connexion with the practical side of his scientific work, but while developing the sublimated views that have been put before you, he is content to point to its quantitative unimportance. No more than some 4 per cent., he urges, of the total energy demands need be supplied in the form of protein. But in dynamic phenomena, such as those which underlie nutrition, the significance and importance of a factor are not measured by its amount but by its indispensability; and no standpoint, it seems to me, can have either theoretical or practical value when it ignores this fact.

Recent researches, as I shall immediately remind you, have added much to an understanding of the significance of the protein element in nutrition; but a more general aspect of the case first requires brief attention. The basis of the doctrine of Rubner and those who think with him is, as we have seen, the claim that one foodstuff can replace another without disturbance to nutrition, so long as the energy supply is unaltered.

Whatever of truth may reside in this so-called law of isodynamic equivalence, as a bald statement it involves a suggestio falsi. No one of the fundamental foodstuffs can completely replace any other, even when the replacement involves no change in energy value. The closer the study of its needs the greater becomes the assurance that a certain minimum of each basal foodstuff is essential to the body. It is seldom desirable to speak of a "law" in biological science, but if we are to use the word at all we may say that in the phenomena of nutrition the law of the minimum overrides the law of isodynamic equivalence. True, it is important to avoid confusion of thought here. Whatever is fully oxidised in the body yields, of course, as it would yield elsewhere, heat equivalent to its energy of combustion. In that limited sense, isodynamic equivalence is involved in the principle of the conservation of energy, which assuredly holds in the body. But the efficiency of every working mechanism demands that the liberation of energy within it should occur in the right place and at the right time. Now the material body is a working system of such a kind that the most influential factor in determining where and when energy shall be liberated within it is the precise chemical nature of the fuel it burns. Not only, then, for the maintenance of its specific chemical structure and for its equipment as a laboratory, but also for the due ordering of its traffic with energy does the body call for a certain harmony and balance in the chemical nature of the materials which it receives from the environment.

Limits of Interchangeability.

Even when we think only of the three basal organic foodstuffs it is by no means true to say that so long as a minimum of protein is supplied the body is indifferent to other interchanges of material. For many years we have been well aware that it is not true at the limit. If carbohydrate be entirely replaced by fat metabolism fails at a crucial point. Complete utilisation of the energy in the fat does not occur. The chemical side of this failure is expressed in the phenomena of ketosis. Ketosis by itself proves that isodynamic equivalence amongst foods is at best a much limited principle. But other facts bear on this question. If carbohydrate and fat were nutritionally interchangeable both should serve equally well as a source of muscular energy. The best evidence available shows that they are not. The point has been very recently investigated afresh by Krogh and Lindhard,[3] of Copenhagen, and their experiments seem to me the most critical and conclusive of any in the literature. They were led to undertake the investigation because of some work done at Cambridge on isolated muscles, the results of which seemed to show that a muscle cannot be indifferent to the form in which its energy is supplied. The Danish observers found that the human body performs work more economically upon carbohydrate than upon fat, and when the work is sufficiently severe it is performed with

[2] From Nährungs Einheit Milch.

[3] Biochem. Jour., 1920, xiv., 290.

greater difficulty upon the fat and occasions greater fatigue. When fat largely predominates over carbohydrates in the food there is a wastage during work of some 11 per cent. of the energy contained in fat. It is not liberated in the right place. Another interesting aspect of metabolism seems to be indicated in this research. We have known that a certain minimum of carbohydrate is required to secure full utilisation of fat. The converse would seem to be true; a certain minimum of fat is necessary for the proper usage of carbohydrate in the body. Although within certain limits these two foodstuffs may be interchangeable limits definitely exist. It is likely from the facts that there exists some proportion between them which would best suit ideal nutrition, but we do not yet know what this may be. It is, at any rate, clear that while the law of isodynamic equivalence is far from having that absolute character which would give it theoretic importance, it may well also fail as a guide in practice.

Protein Supply.

I come now to the still more significant question of protein supply. Just as this century opened marked advancement in the chemistry of proteins began and rapid progress continued. In a few years, aided by new physiological and nutritional studies, which it made possible and stimulated, this particular advance in chemistry greatly increased our grasp of the meaning of nitrogenous metabolism, and our understanding of a most important side of nutrition. It is, indeed, not too much to say that this better knowledge concerning the constitution of these fundamental constituents of living tissues has already exerted a wide influence in all biological science, and in my opinion its ultimate effect will be wider still.

It is, of course, out of the question that I should deal with this advance historically, or allot credit to the many who have helped in it. I can perhaps best remind you of what in this newer knowledge is essential to my theme by rehearsing a few concrete statements.

1. We know that the complex molecule of protein consists of some 20 structural units assembled in what we may call the molecular pattern of the protein. All of these units belong to one chemical genus, since all are residues of α-amino-acids; but each represents a species within the genus, since each has elements of molecular structure which differentiate it from all the rest. The fact that all these units have certain characters in common, and the circumstance that they nevertheless differ so widely, are equally significant in the phenomena of metabolism.

2. In the molecular patterns of diverse proteins any individual unit may occur, in the one case seldom, in another many times, as might be the case with tesseræ of a particular colour in different mosaics. This decides the percentage yield of any particular amino-acid—say tyrosine—when this or that protein is digested. Sometimes, though rarely, a unit or units may be absent from the molecular pattern. The chief protein of maize, for instance, yields on digestion neither lysin nor tryptophane, though these amino-acids are among the score yielded by most proteins.

3. It is the molecular pattern—the arrangement, not the nature, of the constituent units—which differentiates the proteins of different tissues, and, so far as they are different, the proteins of homologous tissues in different species. Such differences are fundamental and underlie morphological differences in plants and in animals.

4. In digestion the pattern of the protein consumed is destroyed. The hydrolytic processes in the alimentary tract liberate the constituent amino-acids, and these, for the most part, if not entirely, are free and individual when, by way of the blood, they reach the tissues. In constructive processes the units are rearranged in patterns peculiar to the proteins of each tissue. Specific characters are thus maintained whatever protein may be eaten.

5. An animal can be maintained indefinitely if instead of intact protein it be given the whole mixture of amino-acids which results from the complete digestion of a normal protein such as the casein of milk. This fact makes it possible to test the nutritive importance of each individual amino-acid by observing the effect upon the animal of removing it, and it alone, from its food. By this method it has been shown that the body can dispense with certain parts of its food protein—usually the amino-acids of relatively simple structure—because it can make them for itself. On the other hand, with others it dispenses less easily, and some—usually the more complex in structure—prove to be wholly indispensable, and must have a certain minimal representation in the diet.

6. It should be understood that the function of any individual amino-acid need not be confined to its share in the reconstruction of tissue proteins. It may be the indispensable raw material for more specific chemical processes. As a single instance of such a function it may be noted that the iodine of the thyroid gland is present in an indol compound. One particular amino-acid from protein, tryptophane, is itself an indol derivative, and almost certainly is constantly required for maintenance of the thyroid function.

7. It follows from all this that nutritive values require, in the case of proteins, definition in detail. The minimal amount of a given protein which is adequate for maintenance will depend upon the amount it contains of that particular essential amino-acid in which it is most deficient. Different proteins may thus have very different nutritive values, a fact which may be, and has been, directly and very fully proved.

The body, therefore, in a given case may suffer from defect in the quality rather than from deficiency in the quantity of protein eaten.

Vitamine Supply.

But as was urged earlier in this lecture nutrition may wholly fail even when the supply of protein, no less than that of the fat, carbohydrate, and minerals is perfect. In such a case we should nowadays look to a deficiency in vitamines. I wish I might prove able to put the subject of vitamines or accessory food substances (as earlier in their history I ventured to call them) in the right light and in proper proportions.[4] The subject is no longer in a strict sense new, but its practical importance needs, perhaps, appraisement. Believing personally that the nutritional function of vitamines is a most significant fact, with important bearings in practical medicine, I yet recognise that when wide claims are made for this view a critical attitude may still be justified.

The chemical nature of vitamines remains unknown. As such they have never been isolated. Now one can quite well understand the consequent attitude of the practically minded. An agriculturist, concerned with the feeding of stock, assured one of my colleagues that he would believe in vitamines only when their price per hundredweight could be quoted in the market. One can sympathise with this practical attitude, but one sympathises less with the scientific man who refrains from an endeavour to appraise their importance until such time as when they have been separated in a pure condition. To be logical he should then avert his eyes from such agents as toxins and antitoxins, not to speak of enzymes; powerful realities all of them which, though of unknown constitution, by no means elude objective and quantitative study. It is doubtless easier for those who, like myself, have seen the facts illustrated by the fates of hundreds of animals, to believe that the whole difference between complete failure of nutrition on the one hand, and perfect nutrition on the other, may depend upon the presence of uncharacterised materials in amounts which, while not infinitesimal, may be extraordinarily small.

Though the history of knowledge might well forbid the question, it may be asked, How, if the influence of such factors is so important, can they have eluded observation till now? Discriminating studies of human nutrition in which scientific thought has been applied to quantitative observations, or at any rate those recorded studies which make up the orthodox literature of the subject, had mostly been made at centres of learning, situated among communities receiving that variety of food which is characteristic of Western civilisation. Strong suggestions for the importance of details are under such circumstances lacking, for the necessary details are automatically supplied. Suggestions, sometimes vague, sometimes really clear, have, as a matter of fact, been frequent enough in the writings of those who in the past have been responsible for the feeding of communities when stress and shortage exist, or when, as on voyages of discovery, food has become abnormal or restricted in kind. As you know, it was from the East, where diets are more one-sided, and the security due to compensatory variety much less, that some of the more important of the evidence came

[4] I can make no attempt to deal with the literature of vitamines, and those who have advanced the subject will, I trust, excuse the absence of reference to their labours.

to justify the newer conceptions that are now establishing themselves.

The experimentalists of the last three-fourths of a century, though they have thought in terms of proteins, fats, and carbohydrates, have never given these substances to their subjects in pure form; otherwise they would long ago have learned that they alone could not maintain organic nutrition. They gave natural foods, while ignoring, for the most part, the fact that such foods, being themselves plant or animal tissues, contained a great number of substances other than the basal protein, &c. Yet the nutritional value of these surely called for study. Most of these other substances, however, are present, individually, in small amount, and it will be readily understood that, so long as the tendency to view nutrition more or less exclusively from the standpoint of energetics was wholly in the ascendant, the minds of the students were averted from a consideration of substances which could contribute so little to caloric value.

But while the animal so clearly depends upon the plant, which alone can trap solar energy, for its supply of calories it depends upon the latter no less for highly specific materials. The urgent need for certain amino-acids is sufficient proof of this. But there was no logical reason for the tacit assumption that this need could extend only to substances which, like the protein constituents, or the fat and carbohydrates, are made by the plant in relatively large quantity. A few experimentalists have, it is true, set themselves to discover if any of the known minor constituents of natural foods—that is, in the ultimate tissue, the minor constituents of plant tissues—are of nutritional importance. It is now sure that the animal body can dispense with every one of these which happens to have been isolated in a pure form; with every one which is, in the strictest sense, known. It may be a coincidence or there may be chemical reasons for the circumstance that the highly active constituents have escaped isolation. It is at any rate among the unknown minor products of plant life that substances indispensable for the animal are found, and these we call vitamines. There is, in fact, at present no other definition of a vitamine as a nutrient, but what is based upon its indispensability, its very low effective concentration, and, if you will, our ignorance of its chemical nature. Doubtless had such substances been easy for the chemist to isolate they would have been isolated long ago, and a knowledge of their chemical nature might well have preceded the knowledge of their nutritive importance. The sequence was fated to be the reverse of this. At any rate, it is quite sure that there is no fear in this connexion that the known is masquerading as the unknown. Some seem to have suspected this possibility, but the crucial experiments have been far too discriminating. The technique used in the study of vitamines has now indeed some elements of exactitude. They can be removed from diets, and restored to them in a high degree of artificial concentration. They display specific properties sufficient for clear distinctions to be made among them, and more than sufficient to prove that they belong to chemical categories different from those containing the better-known foodstuffs.

I have been so far concerned to point out that, while there is no great reason for surprise in the circumstance that studies of nutrition, made on lines that had become orthodox, did not earlier lead to any conception of nutrients of the vitamine type, there is also no reason at all for surprise in the fact that substances with the qualities ascribed to them do, after all, exist. There is, perhaps, on the other hand, some reason for surprise when we find that the quality which, as I have said, really serves at present to define them is displayed to so high a degree. I mean their power of exerting a nutritional influence altogether out of proportion to their concentration in the food.

You will not expect here any technical discussion concerning these substances. This lecture is covering too wide a ground for my remarks to have other than general bearings. I would only remind you that at present three vitamines are known, to each of which I must refer in a later brief discussion of deficiency disease. It is quite likely that others exist, and their discovery may make clearer certain aspects of faulty nutrition, which are yet obscure.

The Law of the Minimum.

I would ask you at this stage of the discussion to note how very far the more newly won facts, especially those concerning the protein and vitamine supply, have carried us from the doctrines earlier discussed. Contrast Rubner's claim that the animal body makes no demand for specific material but only for energy, with the fact that when deprived of materials which contribute at most some few hundredths of its total food, the body fails altogether to make proper use of other of the energy supply. Rubner and those who think with him would speak of energy supply as the one essential "limiting factor" in nutrition. What we have actually to recognise is that each of several factors may become that which limits efficiency, and that no one of these is in any strict sense more important than any other. Normal nutrition calls for a certain minimum of each one and every one. If a diet is harmoniously balanced in a chemical sense, then indeed energy does become the sole limiting factor. Nutrition then fails, of course, only when too little of the diet is eaten to yield the essential minimum of energy. But the supply of fat may become the limiting factor, and no less that of carbohydrate. Or, again, when the supply of energy consumed is ample, with fat and carbohydrate duly adjusted, the circumstance that a single essential amino-acid in one case, or a vitamine in another, is present in amount below the necessary minimum converts each of these in turn into the factor which limits utilisation. Small as the necessary minimum in either case may be, unless it is reached the proper use of the rest of the diet is reduced to a degree which is proportional to the deficiency. If the deficiency be complete normal utilisation is altogether impossible.

This is a statement of the working of the Law of the Minimum, a much more significant principle in nutritional phenomena than the Law of Isodynamic Equivalence.

It is of course true that in civilised and prosperous communities the large variety of foods upon the market and the natural instincts of those who can afford to purchase them, secure for the most part the consumption of well-balanced dietaries, so that when, say, the requirements of a particular calling in such a community are to be estimated, energy measurements yield a justifiable criterion. It is nevertheless important to remember that even in the midst of plenty individuals, and even communities, may consume chemically deficient diets, and a proof that their energy consumption is normal may then lead to very wrong conclusions.

Under special conditions of existence the protection afforded by variety in food may so fail as to make possible dramatic consequences in the form of deficiency disease.

Scurvy and Food Deficiency.

The conception that a specific disease may be due to a specific deficiency in diet appealed to some, even long ago, as involving, logically, a possibility. For many who have passed through certain experiences—the conditions of war contributing—the possibility has become a fact. Others, however, still accept the available evidence for the existence of this particular case of cause and effect with considerable reserve. To me the phenomena of scurvy in the adult have always seemed to provide a touchstone. They were surely sufficient to justify belief in one deficiency disease at any rate long before it was supported by other evidence. It will, indeed, further the aims of this address if I ask you to consider a little the case of scurvy, familiar as it is, even at the cost of my giving insufficient attention to other cases.

The element of drama seems always to be present in the literature of scurvy, be it in professional writings or when, as long ago used often to be the case, it inspires the pens of the laity. No one can read some of these earlier records of the disease at its worst—for instance, the account given by Richard Walter, Anson's chaplain on board the *Centurion*—without something of a thrill. But though its ravages were greatest on the old slow-sailing ships, cut off from fresh foods for long weeks

together, it was common enough two centuries ago among certain communities at home. It is of interest on this occasion to recall a remark made by Huxley when writing of David Hume. Huxley, recalling that during one period of his early life Hume developed symptoms of scurvy, speaks of it as "a disease now almost unknown among landsmen, but which, in the days of winter salt meat, before root crops flourished in the Lothians, greatly plagued our forefathers." In Hume's case there was a dramatic disappearance of the disorder. His circumstances improved, he developed a voracious appetite, and in six weeks, Huxley reports, from being lean and raw-boned (and scorbutic) he became sturdy and robust, with a ruddy complexion and a cheerful countenance.

But it is, of course, in naval records that the dramatic side of the disease is most evident. We will think, however, only of the successive acts in the story of prophylaxis and recall, first, how, after being a heavy scourge, scurvy practically disappeared from the ships, when, in 1796, the wisdom of Sir Gilbert Blane decreed a ration of lemon-juice for all and sundry. In the second act of the drama scurvy reappears. The fruit-juice was thereupon gravely discredited; but fortunately a prophylactic of quite different sort made the tragedy less. Steam was soon to carry the mariner, more swiftly than could sails, to ports and supplies of fresh foods. The last acts in the story are recent. Science at the Lister Institute demonstrated that the juice of one variety of citron is not the same as that of a related variety. The historical research of Mrs. Henderson Smith brought this knowledge into relation with the story of scurvy in the navy. The juice which had protected everybody so well at the end of the eighteenth century, and during the first half of the nineteenth, was that of sweet limes and lemons. When the trouble reappeared it was because for economic reasons the juice of the West Indian or sour lime had been substituted. But the latter has now been shown to contain only a fraction of the amount of the antiscorbutic vitamine which is present in the former and contains it in a less stable form. Surely this is an interesting correlation in circumstance. I have dwelt upon the matter because it clearly shows how specific may be a material bodily need: need for a substance produced in all plants but of such a special nature that it may be freely stored in the fruit of one variety of a species, but scarcely at all in that of a related variety! And I dwell upon the history of scurvy generally because it illustrates so well how a bias or habit of mind (so, at least, it seems to me) may affect thought about ætiology.

As Surgeon Rear-Admiral P. W. Bassett-Smith has pointed out,[5] Blane, a century and a quarter ago, attributed the disease to the lack of a "certain element which is necessary for growth and repair" thereby foreshadowing definitely enough the conception of a deficiency disease. But the great naval hygienist saw much of scurvy and its remarkable response to treatment. Later authorities have often seen much less and speculated more. If they could discard for a moment the obsessions of intoxication and infection and accepted the obvious significance of diet in scurvy, they thought only in terms of the known, and looked, for instance, to the absence of potassium salts or the organic acids of fruits as the causative factor, oblivious of the fact that the stability of such substances ruled them out of all relation. But up to quite recently, though not, I think, since the coming of the impressive evidence made available by war conditions, there have been many struggles to bring scurvy back into the category of infection or intoxication. I put it to you (as counsel would say) that, considering the nature of the evidence, such endeavours can only be due to the obsession that some positive agent—some intruder so to speak—must always dominate ætiology. Several recent writers, concerning themselves with the definition of deficiency disease, have criticised the use of the term "negative cause" and doubtless to formal logic such a term would be abhorrent. But it is better to use a somewhat illogical term than to miss some solid meaning which is conveniently conveyed by it. We must either speak of the cause of scurvy being the absence of something from the diet, or, because of its casuistic accretions, avoid the word cause altogether. Objection to a term is a small matter, but apparently with some the objection involves the practical standpoint that the production of phenomena like the symptoms of disease can only be due to the influence of some positive factor. If not to a poison or to infection, then to excess of something. Certain authors find it logical to refer causation to excess, but illogical to refer it to defect. They feel perhaps that the latter course takes liberties with the old adage "Ex nihilo nihil fit." But do not such views carry us back to the popular or metaphysical conception of cause as enforcement, and away from the scientific conception of cause as the routine of experience? Causation, in the words of John Stuart Mill, is recognised by uniform antecedence.[6] Antecedent to normal nutritional phenomena is the consumption of a particular set of essential nutrients. If in the absence of one of them the sequence proves to be consistently different, such absence is then the reason (for we may avoid the word cause) for that difference. So we may say the reason for scurvy is the absence of the unstable antiscorbutic vitamine, and it is a sufficient reason.

But through long years, so notable in other respects for great advances in knowledge concerning the origin of disease, the pointings of scurvy failed to give rise in the modern mind to any clear-cut conception that the body, being a chemical system depending upon the law of the minimum, might well lose its equilibrium for lack of some minor but perfectly specific dietetic factor. It required other evidence to give birth to the conception. This came in the first place from an intensive study of the relation of diet to another disease—beri-beri. The final issue here has been a practical certainty that the symptoms arise from a different but equally specific failure in supply—the lack of the so-called water-soluble vitamine. But had the further evidence come alone from the pathological side it is doubtful if it would have compelled the arrival of a general idea. At the same time, however, proof was being provided, as we have seen, that apart from any manifestation of disease normal growth and maintenance fail in the absence of the same or similar factors of supply. Under the compulsion of all the facts the idea of a vitamine crystalled out, and carried with it the understanding that deficiency might be a real element in the ætiology of disease.

Fat-soluble Vitamine.

An essential accessory nutrient clearly different from the anti-scorbutic substance and from that other made so familiar by the story of beri-beri came later into knowledge. This is the so-called fat-soluble vitamine. It is made by the plant, is present universally in green vegetable tissues, and is in most seeds, but it does not necessarily accompany the vegetable oils and fats when these are expressed or extracted. The animal, however, happens to store this substance in association with its depôts of fat—hence its name. Grave errors in nutrition follow upon its absence from the diet, and this circumstance has added a greatly increased importance to the whole question of the national fat-supply. Once again we learn that something more than the gross amount of a foodstuff must be considered in evaluating its nutritional capacity. For the future we must apply a new criterion of value to fats.

I will not now discuss the relations of fat-soluble vitamine deficiency to disease, though the matter is one of profound and present interest. Many points are at issue, but intensive work is being done, and our knowledge will rapidly increase. In my belief the practical issues will ultimately be astonishing in their importance.

Pellagra.

Since your attention was for so long directed to the question of protein, I must, before closing, refer to the possibility that an ill-balanced protein supply may be a reason for failure in health. In this connexion we turn to pellagra. Of this disease much has been heard of late, and its interest was enhanced by its prevalence

[5] Proc. Roy. Soc. Med., 1920, xiii. (War Section), 51.

[6] Cf. Karl Pearson: Grammar of Science, second edition, p. 113.

under the conditions of the war. The supposed evidence for an infective or toxic origin has gradually weakened, while that pointing to a dependence upon diet has recently become strong. Goldberger, who has studied it closely in America, considers that it follows upon the consumption of diets in which more than one deficiency, including constitutional faults in the protein eaten, contributes to the total result—a view which can, I think, be harmonised with all that we know about metabolism. But W. H. Wilson, of Cairo, holds that dependence upon proteins of "low biological value"—ill-balanced proteins—is the main determinant. The evidence, you should understand, is yet far from complete, but two striking experiences may be mentioned. Wilson found pellagra rife in a camp of Armenian refugees, and noted that their diet, though sufficient in caloric value, contained proteins of low nutritive value only. At his suggestion this error was corrected and, without other changes in treatment, pellagra thereupon disappeared.[7]

Goldberger[8] has studied the question in a large asylum. In all its wards were cases of pellagra among both coloured and white patients. The only change he introduced was an improvement in the quality of the proteins of the food. But with this pellagra disappeared from his wards, though persisting in other wards where the change was not made. When from the latter pellagrins were transferred to Goldberger's wards his treatment was equally successful. There are probably other factors in the ætiology of pellagra, but its behaviour strengthens much other evidence which shows that the recognition of specificity in proteins is of more than academic importance. If the application of all these considerations to practical medicine bore only upon the production of actual disease they would have far less importance than, in my belief, is actually attached to them. A deficiency which when extreme produces actual disease will, almost certainly, when less extreme involve some failure in health.

I was once greatly impressed with happenings at a large preparatory school. The boys were mostly quite young. Their health during a winter term was vaguely unsatisfactory. The majority became listless; the standard both of work and play fell much below normal, and various forms of minor trouble were reported. Explanation seemed difficult. The drains were inspected, throats were swabbed, but nothing came to light. The diet was considered, but was found to be ample and of good quality. Finally, however, it was noticed that being a winter term the kitchen supplied almost nothing in the way of uncooked food; and relatively little of green vegetables or fruit, whether cooked or otherwise. This by itself would perhaps have mattered little; but during that term it happened that the village shop where the boys had been wont to spend a portion of their pocket money upon fruit was closed. When this was realised, and a little fresh fruit supplied, all trouble disappeared. There was at no time scurvy in the technical sense, but the school was assuredly feeling a lack of the anti-scorbutic vitamine.

If the practitioner, when considering whether diet may not be the cause of a case of ill-health, has in his mind the idea of specific deficiencies he will no longer reject the possibility when general underfeeding or ill digestion alone have been excluded. Realising that details must be considered, he will, in my opinion, be able to ascribe more to diet than hitherto, and at the same time extend his list of cases diagnosed. Mostly will this prove true when the patients are young.

If we prove justified in ascribing to nutritional errors more—even a little more—of failure of health and development in children, the circumstance will surely be a happy one. A little more of evil becomes referable to nurture instead of to nature; to environment instead of to inheritance; and, therefore, to the remediable instead of to the irremediable.

Conclusion.

Before closing my remarks I would like to say why I think the coming year will stand out in the history of the developments which have been before you. No secret will be betrayed by reference to what may prove a classical experiment: An experiment on human material, involving a comparison; yet wholly legitimate, because each of the policies which will be compared possesses the complete faith of those who will carry it out.

Under the scientific auspices of the Lister Institute and the Medical Research Council Dr. Harriette Chick and Dr. Elsie Dalyell, with a proper staff, are in Vienna, in the home of the Nem System. They are there to apply the newer principles to the nutrition of children in the wards of von Pirquet. In adjacent wards the Nem System will go on undisturbed. A real comparison will therefore be made. The enterprise is unique in its occasion, in its international character, and in the high qualifications of those who are to conduct it.

I venture on no prophecy as to the outcome, but I cannot help holding very firmly to the faith that Vienna will show how important to practical medicine are recent advances in the science of nutrition.

[7] Ministry of Interior, Report for the Year 1918. Government Press, Cairo. [8] Medical Annual, 1920, p. 270.

An Address
ON THE
PSYCHOLOGY OF ANÆSTHESIA.

Read before the Section of Anæsthetics of the Royal Society of Medicine

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SOME explanation of the title of this paper seems desirable. Psychology is defined in the dictionaries as "the science of the phenomena of mind—mental science," but as under anæsthesia the functions of the mind are commonly held to be out of action it may appear inaccurate to formulate any connexion between the causation of the phenomena evinced by an individual under anæsthesia and psychology. I hope, however, to be able to show that there are quasi-mental phenomena during narcosis. Any alternative title would have necessitated the employment of a long and cumbersome explanatory phrase.

In his "Metaphysics" Sir William Hamilton defined psychology as "the Philosophy of the Human Mind, strictly so denominated is the science conversant about the phenomena or modification, or states of the mind, or Conscious subject, or Soul, or Spirit, or Self, or Ego." This extends the limits of psychology, and since the days of Hamilton biology has enabled us to accept a still wider concept of the sphere of psychology, for we now accept that science as capable of enfolding experimental investigations of phenomena which cannot in any sense be regarded as confined to the action of the conscious mind. The materialistic school accept psychology as a science dealing with the phenomena of the conscious being even although the Psyche is not in its view the Soul, or the Spirit, or indeed the Self or Ego taken as an individual entity out of relation to its phylogenetic origin. Dr. G. W. Crile, whose work stands out as a bold attempt to explain the phenomena of man's life by a study of the cellular changes observable in his brain after physical work—and physical work is in his view the objective evidence of stimulation of his brain matter—offers us a definition of psychology. He suggests that it is "a science of man's activities as determined by the environmental stimuli of his phylogeny and of his ontogeny." Such activities may be of the conscious or the subconscious mind.

Anæsthesia and the Abolition of Consciousness.

I suggest that we are justified in believing that the older views about the mentality of a person under anæsthesia are inaccurate and need modification. Indeed, I submit that we are justified in postulating that the abolition of consciousness does not necessarily predicate the smothering of all emanations from the higher brain centres, although such emanations differ both in kind and degree with the depth of the narcosis.

The old concept of anæsthesia and deep narcosis was that the individual in such a state was practically in the condition of a frog whose brain has been destroyed. It was taught that the animal functions necessary for the persistence of life were preserved, but they were no longer subject to modi-

fication or under any sort of control by the brain centres. This view, I submit, we must now throw over.

Many of the avenues which bring an individual into communication with his enviroment are certainly closed under anæsthesia, but how many I think we are at present unable to determine. The number of such closed doors, and the extent to which some of them may be left ajar, or opened under sufficient peripheral stimulation, is also matter for investigation. But supposing that the anæsthetised person is cut off from any relation with other individuals we have no evidence that he does not retain some degree of consciousness, or if one may be permitted the term, of subconsciousness. In such a state, although he cannot functionate as an intelligent being or have any inclination so to do, he may, under appropriate external stimuli or auto-stimulation, bring about effects which influence his personal welfare. The extent of our adoption of this view is a severely practical problem the solution of which cannot fail to assist us in our everyday work as anæsthetists.

The commonly accepted tests of consciousness are only reliable in so far as they give evidence of the abrogation of certain reflexes; they give us no information concerning the persistence or absence of subconsciousness, if such subconsciousness does, indeed, survive the intensive application of anæsthetics.

If I may interpolate a suggestion at this point which the use of the phrase "the intensive application of anæsthetics" invites, it may shed a little light upon the question of the persistence of subconsciousness.

Differing Intensity of Action of Anæsthetics.

The various anæsthetics in use differ in the degree or intensity in which they act. Accepting the usual abolition of reflexes as criteria of anæsthesia we recognise that Snow's third degree of narcosis—surgical anæsthesia—is a profounder condition of unconsciousness under chloroform than under ether, demanding a longer period of recovery of mental balance, and ether in turn produces a deeper state than nitrous oxide gas, although to outward seeming each has rendered the patient merely "anæsthetic." It may be a question of the depth of the penetration of the drug into the protoplasm of the cells of the nervous system. Even if this is a mere matter of physical and chemical interaction it is not extravagant to suggest that anæsthesia may be caused before the entire abrogation of subconsciousness.

Unconscious Cerebration or "Awareness."

Carpenter, in his "Mental Physiology," gives some extremely interesting and in this connexion important instances of what he termed "unconscious cerebration." The individual's ego functionated with his higher cerebral centres but did so without being aware of such activity. The usual effect of ratiocination was brought about, but ratiocination was non-existent.

I am fully alive to the fact that psychologists may decline to accept my connotation of the terms subconscious and unconscious cerebration, and I readily admit the use of them is open to grave adverse criticism; still I can discover no better words and trust that I may be forgiven, and—what is more important—that my meaning may be clear. As to the proofs that such residuum of consciousness persists under certain degrees of narcosis—anæsthesia, semi-anæsthesia, and so on—such proofs are only presumptive and I propose to deal with them immediately.

The trend of modern thought is to recognise that the state usually designated consciousness is really an epiphenomenon, that throughout the nervous system there exists an "awareness" which in the higher centres we call consciousness, but which also exists below these centres. It is revealed in the spinal cord by the reflexes with which we are familiar. Some years ago I published the results of experiments which showed that under nitrous oxide gas ankle clonus could be elicited. The patient was unconscious, but below a certain level his awareness was actively present, and being no longer controlled the reflex developed. So it is fair to assume that in certain persons whose higher controls are readily put out of action by anæsthetics, there arise phenomena due to the "awareness" of the centres, even when consciousness is temporarily lost. These phenomena occur during anæsthetisation of neuropaths, neurasthenics, and so on. The truth of these statements has been shown by many cases of cord and brain injury met with in wounded soldiers, although, so far I know, their relation to the problems of anæsthesia has not been recognised. The "awareness" of the centres reaches certain levels and the phenomena vary with the levels reached. If, as I maintain, we are able to alter the level of consciousness or "awareness" by anæsthetics, we bring about states similar to those arising through trauma affecting the higher or lower centres. The "awareness" may and does persist in the lower centres, while consciousness, the "awareness" of the brain, is lessened or lost. I am indebted to Dr. Henry Head for the term "awareness," which seems more suitable than the expressions "subconsciousness," "liminal state," and "unconscious cerebration." We need a word to express the residual state of activity of the parts of the nervous system when gross consciousness is abrogated or lost.

Nerve Storms during Anæsthesia.

Crile would have us believe that a physical impress is made on the brain cells by the emotions, notably by fear, the emotion with which our work brings us into closest contact.

In his "Origin and Nature of the Emotions" he discusses these matters and compares the effects of emotions to those of trauma under anæsthesia. He writes: "Although no pain is felt in operations under inhalation anæsthesia, *the nerve impulses excited by a surgical operation still reach the brain.*" In this statement he is not in accord with the findings of Longet or of Waller based upon their classical experiments on the spinal nerves, since these observers recognised that anæsthetics act directly upon the nerves as well as upon the nerve centres. We may now consider these facts, which are suggestive, even if they do not amount to proof.

My experience has forced upon me the need for an explanation of the nerve storms and bizarre phenomena arising during induction and maintenance of anæsthesia in certain types of subject. For many years I had remarked that soldiers, whether officers or privates, were not only very difficult to anæsthetise, but were prone to evince unusual and often dangerous phenomena, both in "going off" and throughout the operation. Similarly I found neuropaths, highly nervous persons and that large class of patients whom we group somewhat unsatisfactorily in the category of neurasthenics, with babies and alcoholics, resembled soldiers in being "bad patients." What struck me most was that persons possessing an unstable nervous system evidenced by curious and troublesome nerve symptoms, were liable, even although no definite disease of their central nervous centres existed, to unusual phenomena both during induction and maintenance of anæsthesia. They appeared to project their conscious nerve dyscrasia into the period of anæsthesia, so that nerve storms arose interfering with respiration, circulation, and other functions. What I wish to indicate is that in these cases temperamental peculiarities became manifest even when consciousness was absent. One is tempted to add, even though consciousness was absent, a residual subconsciousness persisted; the higher centres, cut off from the external world by the anæsthetic, remained in function and dominated those centres which were necessarily still active for the maintenance of life. Possibly such nerve activity is of a quasi-defensive character or arises through abolition of repression of phylogenic activities. Psycho-analysis, to which I shall return, may help us to explain these phenomena.

In the categories of babies and alcoholics we have other factors with which to deal. In the first class there exists a notably unstable nerve-centre equilibrium and a narrow margin between the zone of anæsthesia and the spread of narcosis to the degree of overdosing of the whole nervous system. Babies and young children are dominated by their phylogeny, their ontogeny being as yet hardly developed.

I was at one time tempted to believe that alcoholics were bad subjects because their tissues were more or less damaged; this, however, is a half-truth, and does not explain why in their case the unusual phenomena of anæsthesia resemble in a remarkable degree those which emerge in the case of neuropaths and neurasthenics. I think I overlooked the fact that alcoholismus is a disease grafted upon an individual whose nervous system is on the borderland of abnormality; possibly others have made the same mistake. If this be a true deduction we have in their case to deal with patients who have a nervous system obnoxious to such drugs as anæsthetics and have lost their normal recuperative and resistive powers owing to chronic toxæmia. It is an interesting fact that alcoholics are extremely prone, even under profound anæsthesia, to move, to phonate, and to exhibit symptoms which may well be defensive or a revival of repressed phylogenic activities.

Observations on Soldiers.

These observations were made by one anæsthetist, and may be open to criticism on that score, but they fall into line with those of other workers who anæsthetised many soldiers during the war and placed their experiences on record.

In the first place it has to be remembered that the armies were composed of many different types of men, alike only in being below middle age, who were, although physically fit, often subjects of some nervous disability. We are told that one man who had had two attacks of insanity was passed as

having "a slight defect but not enough for rejection." My experience indicates that most of the men, whether really fit or suffering from nervous inefficiency, were "bad subjects." They took a great quantity of the anæsthetic before losing consciousness, were prone to struggle, to fight, to be restless, even after the ocular reflexes were in abeyance, and were very liable to respiratory and circulatory crises even when there was no more than the usual degree of trauma. Unlike the poorly nourished neuropath, who often evinces some untoward symptoms following the anæsthetic, they usually recovered consciousness normally. Some, however, passed through a stage of delirium resembling mania, and showed no further unusual after-effects. Perhaps I should modify this statement and divide the new army men into two classes—those who resembled the units of the old army in being physically fit and possessing good health, and those who were rendered "fit" by an intensive training. This latter type often showed severe after-effects.

Anæsthesia and Psychoses.

We learn[1] that whereas no new psychoses were developed as a result of war stress (Weyganat), war excursions and alarums were liable to fan into flame any latent predisposition to nervous disease. Psychoses we recognise as arising through toxæmic conditions or from mental conflict (psychogenic), and whatever the origin of the state there can be no doubt that those who are the subject of some psychosis develop unusual phenomena when given an anæsthetic. We owe to the workers in psycho-analysis the knowledge that our mentality is a complex of derived—that is, phylogenic—instincts and ontogenic or individual traits. The former are repressed in normal civilisation, but during war the primitive animal instincts escape; the fighter is no longer his former self as he was in civil life. A like change is engendered and favoured by acute illness, severe trauma, especially that of the head or spine, since these conditions, together with the unwise use of alcohol, cause loss of the habitual inhibition of the savage instincts of mankind. Another point of some importance is one noted by Read, "that the necessary curtailment of free thought and action involved in army discipline naturally leads to much repression." This repression at length calls for a vent for the lower instincts and an escape into the unbridled licence of savagery. Cannon has shown that intense emotions provoke adrenalism, and we are probably correct in believing that the secretions of the ductless glands other than the adrenals are also increased by similar stimulation. The soldier about to take an anæsthetic is usually under the dominance of fear and of other emotions, and he exercises severe repression so long as his controlling centres remain in control of his actions. He no longer has the support of "the herd," but experiences an exaggerated fear of what is to happen to him and the necessity for self-protection. The effect of the anæsthetic is to destroy the systems of restraint and open the flood-gates of primitive instincts, which in this case seek to liberate him from those who hold him; he even endeavours to destroy the latter, since they are for the nonce his obvious enemies. As Dr. Ernest Jones has indicated,[2] the investigations of psycho-analysis have shown that the influence on conscious life of these impulses (primitive inherited instincts), which are in a repressed state in the unconscious mind, is of an unexpected importance, and, what is more, that the impulses themselves are indestructible. Moreover, the adrenalism to which reference was made above no doubt accounts for some of the abnormal states of the circulation so common in such cases.

We may sketch the mental picture in the mind of the fighter and recognise that it may provoke the outbursts of disconcerting activity under the anæsthetic. In some men it is the vivid recalling of recent experiences, in others the blurred impression of a phylogenic complex which carries the individual back to a primitive environment. Are we justified in believing that this is the explanation of abnormal phenomena which develop during anæsthesia in individuals of the classes we have considered? It may be objected that there is a gulf fixed between the mentality of the soldier and that of the civil neuropath, but such is not really the case. Similar results are reached, although by different routes. The berserker rage of the warrior and the perverted mind-state, conscious or subconscious, of the neuropath are one and the same departure from the normal, and as such cause similar phenomena under anæsthesia.

Dreams Occurring under Anæsthesia.

There is another and most interesting aspect of this question—the study of dreams which have occurred under anæsthesia and left a profound impression on the unconscious mind. The study of these dreams sheds some light upon the psychology of the state, and seems to support the contention that there is a period of liminal consciousness beyond that which passes into abeyance early in narcosis.

Dreams, common with every kind of general anæsthetic, are not always remembered. Patients will say that they had a "lovely" or a "dreadful" dream, but cannot recall it in detail. Many such dreams probably arise as the patient is resuming consciousness; if of a disagreeable character they are usually the result of some perception of pain due to the concluding steps of an operation or of "after pain." This is a common type with nitrous oxide gas inhalation, and has little significance for us in the present connexion. Pleasurable dreams fall into another category; they are worthy of close investigation, as are also the dreams often called "horrors," which leave an indelible impress upon the mind and may be recalled at wide intervals of time under subsequent anæsthetisations.

Among such dreams we can recognise types. The erotic type, not infrequent with nitrous oxide gas or ether, and less common with chloroform, can often be recognised by muscular movements which suggest orgasm. The patient, unconscious of his or her surroundings at the time they occur, is left somewhat exhausted, and in the case of women obviously disturbed if the anæsthesia has been brief and recollection of the erotic sensation is dimly present upon recovery. It is such dreams which form the basis of charges of assault often preferred in good faith against surgeon, dentist, or anæsthetist. I have been told repeatedly by men that they have had a "good time," meaning erotic dreams have lightened the tedium of anæsthesia. Those who enjoy the sensation of alcoholic exhilaration will say they have had a "splendid drunk," and their muscular movements during the stage of recovery suggest bacchanalian fancies and amatory hallucination.

Deeply Impressed Dreams.

I have met with different forms of dreams deeply impressed and either remembered or recalled. The importance of these is great.

A person will have a dream under an anæsthetic which is so vivid as to amount to a subconscious experience, as if it were an episode in another life. One recalls the case of John Addington Symonds. At the period of his mental storm and stress, I think when he was at Davos, his mind was perturbed by doubts as to the truth of revealed religion. Symonds was given an anæsthetic and under its influence he passed into what he describes as a kind of trance. The presence of the Almighty was revealed to him and the Voice said, "It is I whom you deny." One need not labour the story, it is one of the type of constructive dreams which are very vivid and persist. I had a patient who, like a character in George Du Maurier's novel "Peter Ibbetsen," "dreamed true." She told me that every time she inhaled nitrous oxide she dreamed of a friend, and felt as if she was in the society of this friend; she remembered what she had dreamed before, took up the thread of the narrative, and continued it in each successive dream. I regret I have lost touch with this patient and so am trusting to my memory concerning it and to a scant note made at the time when I was told the story. In another case the patient informed me that she always had "a delightful dream," which was repeated on each occasion when she took gas. The details she kept to herself.

In these dreams we find a persistent impression left upon the subconscious mind, capable of being revived under certain presumably similar conditions.

The best example of this I have met with was in a highly intellectual man, a teacher at one of the old universities, highly nervous and neurotic. He had to have all his teeth removed but could not face the ordeal. Finally, his sister, also an intellectual, who had been a patient of mine, suggested he should consult me. His history was typical of many such cases. In childhood he had been given an anæsthetic and had had an exceedingly bad time. The recollection of that experience was an abiding horror. When I saw him it was obvious that his condition was a serious one; he was being poisoned but he refused an anæsthetic and distrusted any local analgesia. Luckily his sister had impressed him with my ability to help him. He consented to be re-educated as regards the effects of nitrous oxide, provided I promised to desist from any administration when he felt the old horror was gripping him. By repeated administrations, at first brief and stopped before unconsciousness, I was able to build up his confidence and belief in the efficacy of the anæsthetic, and so to submerge the old associated horror beneath the new and agreeable sensation. Of course this case is an extreme one, but it is probable that many patients who exhibit maniacal fear—a very dangerous thing during induction of anæsthesia—do so as a result of the revival in their subconscious state of preceding, and possibly forgotten, experiences which have deeply scarred their subconscious mind.

I think these cases, especially those in which a dream is repeated in identical detail at wide intervals of time,

[1] Military Psychiatry in Peace and War, C. Stanford Read, M.D.
[2] War and Individual Psychology, Sociological Review, July, 1915.

indicate that in anæsthesia we are dealing not only with ordinary consciousness as tested by motor reflexes, but with the subconscious hidden mind, access to which is made possible again and again when the use of an anæsthetic is invoked on successive occasions. But some patients who long before taking an anæsthetic have lived abroad have during the induction period of anæsthesia commenced to speak in some native dialect, uttering phrases which had not passed their lips for years. Here we have no associative nexus between the anæsthetic and the harking back to the experiences of bygone years, but I think we have evidence of inhibiting the repression which the new conditions of life in England would naturally impose. Carried further, as it is in many persons, the removal of repression leads to furious struggling and protective efforts, as of one attempting to ward off the attacks of his enemies. In soldiers, as has been said, this is very common.

The Problem of Prophylaxis.

How far anæsthetics can penetrate the veil of the unconscious mind and protect it from obnoxious impressions has yet to be determined. The power to do so is limited, I think, by the individual psyche.

In the classes to which I have particularly referred—those who are the subject of some psychosis, the neurotic, the neurasthenic, the toxæmic, and persons of a poorly developed and unstable nervous system in general—the anæsthetic awakens both phylogenic and ontogenic traits more readily than is the case with the stormless individual with an irreproachable central nervous system. In these classes we expect not only the muscular storms but look for interference with the controls of circulation and respiration with their associate and definite dangers. The establishment of prophylaxis in such persons becomes a practical problem, and one seeks for the assistance furnished by the experience of others. The subject which I have attempted to introduce to you is worthy of extensive study and research; we should receive valuable aid from the neurologist, and from the employment of psycho-analysis we may obtain light on our problem. There is danger that because we now get excellent results even with neuropaths we may relegate the study of psychology to the limbo of the unnecessary developments of thought. It must be noted that anæsthetists seldom have opportunities, unless they make them, of following up abnormal cases for months or for years; so they may miss the profound psychic developments which have their rise in an anæsthesia. We are not infrequently told that such and such a patient must not be given an anæsthetic because of a serious upset and prolonged illness which followed an operation under an anæsthetic which took place some years ago. Such a case is one for study, not one to be refused the benefit of general anæsthesia, since this form of narcosis is peculiarly useful in the case of psychoses and neuropaths. The study made, we should be prepared by knowledge, much of which has yet to be gathered, about the best form of anæsthesia and method of its production, with detailed attention to the patient's environment and preparation. This preparation should often be prolonged, and should be directed not only to the needs of the body, but also to those of the mind. To take a concrete example. Crile's "stealing of the thyroid" is accomplished by a method admirable in its conception since it deals with the patient's mental as well as his physical requirements. I have been greatly struck by a remark of the lady who appears to give many of this surgeon's anæsthetics. She insists that a definite and formal part of the induction scheme she pursues is reassurance of the patient; the mind is supported, fears are banished, and a sense of well-being engendered by the determined efforts of the anæsthetist, while the anæsthetic is steadily given, and given without hurry or impatient intolerance of a nervous person's natural trepidation.

Dangers of Injudicious Administration.

How real is the danger of injudicious methods of administration and of a faulty choice of agents is shown by the following facts.

Sir George Savage has told me that patients who are or have been insane not infrequently develop mania after ether. I have known transient maniacal delirium to arise in patients who at the time of the induction were apparently sane, and have on subsequent occasions substituted chloroform given with oxygen in place of ether with satisfactory results. I am convinced that every ounce of ether saved by limiting the dose during maintenance of anæsthesia, after complete anæsthesia is obtained, is a step towards lessening post-anæsthetic mental disturbance.

I know of at least one case, and others have been noticed, in which acute mania lasting for some weeks has followed the operation of the radical cure of hernia undertaken under a local analgesic. The patient was a medical man of assured sanity, but I do not know whether he had any tendency to a psychosis.

When spinal anæsthesia is employed and no preliminary injections of alkaloids are given, and when a general anæsthetic is not adopted concurrently with the blocking of the spinal nerves, a high degree of psychic shock appears in many cases, the effects of which persist for a considerable time after the operation. This state seems to be in some ways analogous to the effect of a general anæsthetic given to the subject of a psychosis. In the one case the apprehensive centres are wholly unprotected from the perturbations of fear; in the other these centres appear ultimately to be thrown out of action. During the period of induction, however, they are not completely protected, and activate to the extent that they cause the phenomena of struggling, and that nerve storms arise which interfere with respiration, circulation, and the even process of induction.

Anæsthetisation of Psychopaths and Neuropaths.

At present we possess certain methods which my experience of their use extending over some years leads me to believe are satisfactory in cases of individuals who fall into the categories of psychopaths and neuropaths.

The use of alkaloids before inhalation or colonic etherisation is unquestionably valuable. There is a common, but I think mistaken, impression that morphine and atropine best subserve the ends in view. It is general experience that the dose of morphine usually given—namely, ¼ gr. one hour before inhalation—is insufficient to produce the requisite drowsing of the patient, and so larger doses are ordered. This is certainly true in the case of soldiers. Now these large doses of morphine, even if they achieve their aim, exercise a very deleterious effect upon the nervous system and parese the respiratory centre to a dangerous extent. If, however, scopolamine is added to the morphine and atropine a more stuporous effect is arrived at without damaging the functions of respiration. It is true that scopolamine acts in some ways similarly to morphine, but we must remember that it belongs to the atropine group, and so while it drowses the senses it stimulates the respiratory centre. Drugs in combination act in some ways synergically; in others they are antagonistic, as in the case of atropine, morphine, and scopolamine. Another practical point is that we require the optimum effect of these drugs when the induction is commenced. If it comes on later it is a danger, and so at least an hour should elapse between the giving of the hypodermic and the administration of the anæsthetic. An equally important matter is that the patient should be ensured a good night's rest before the operation. The use of a hypnotic may be undesirable in some ways, but its benefit is great in others, the latter being, in my opinion, important. After this night's rest the patient should not be disturbed unless it is absolutely necessary to have enemata or be given indigestible beef-tea.

This, in brief, is the line of treatment I suggest; it will, no doubt, be modified, possibly with advantage, in the hands of others.

Conclusion.

Although this is not strictly a matter for the anæsthetist, it may be noted that gentle surgery protects the patient from reflex dangers, while some form of blocking the centripetal nerves by analgesics, as in Crile's anoci-association method, is probably a protection against some shock effects, although, of course, the latter cannot be entirely abrogated in abdominal or thoracic operations. Another practical point calls for mention. I, no doubt in common with other anæsthetists, have noticed that if the induction is performed hurriedly or without due attention to detail, and if the operation is commenced before absolute anæsthesia has been obtained for some minutes, the whole course of the latter proves unsatisfactory. Do what one may, it is marked by an uneven level of narcosis; vomiting or retching is constantly imminent, and disturbances, usually vagal in origin, are common. Throughout the anæsthesia anxiety and dissatisfaction obtain, and severe after-effects usually occur. I believe that this trouble arises through no initial and complete control having been obtained over the higher centres. Consciousness may eventually be lost, but the influence of the unconscious mind is aroused; for some reason, at the nature of which we can only guess, its effects persist and are hardly abrogated.

To recognise this state is to suggest its treatment, whether or no we admit its suggested causation.

ORAL SEPSIS,

WITH SPECIAL REFERENCE TO CHRONIC DENTAL APICAL INFECTION.[1]

BY W. BERTRAM WATSON, M.D. LOND.,

VICE-PRESIDENT OF THE HARROGATE MEDICAL SOCIETY; HONORARY PHYSICIAN TO THE YORKSHIRE HOME FOR INCURABLE AND CHRONIC DISEASES

THE presence at this meeting of many of our colleagues of the dental profession is an indication that they, as ourselves, realise how essential it is for the well-being of our patients that there should be, in the future, a closer coöperation between the medical and dental professions than has hitherto prevailed. Now that there is conclusive evidence of the importance of oral sepsis as a causative factor in the production of many constitutional diseases, dental theory and practice have become of greater importance; and members of the medical profession will continue to welcome all the help in diagnosis and treatment which can be given by their dental colleagues.

In such societies as ours there is perhaps a tendency rather to present other peoples' views, drawn from medical literature, than to relate personal experiences. You will forgive me if I go to the other extreme, giving you some account of my successes and failures, and of the changes that have taken place in my views on the difficult question of oral sepsis during the 21 years of my professional life.

We have only to look at the medical and dental journals of England and America to see that the question of the influence of dental infection on the health of the individual and of the nation is one of the most discussed problems of the day, and a topic about which the intelligent laity are thinking as well as ourselves. My interest in the question of oral sepsis was first aroused when I was a clerk and house physician at St. Mary's Hospital in the late "nineties," as a result of the study of the writings of Dr. William Hunter, the pioneer in this field of research. As has always been the case with teachers preaching a new gospel, Hunter's message for a long time fell on deaf ears, but the great value of his work is now fully realised; and his writings on oral sepsis as a cause of disease are as well worthy of study to-day as when they were written 20 years ago.

For the past 18 years my work, as is the case with most of my hearers, has lain in the sphere of chronic disease. I do not think it is altogether a disadvantage that patients who are sent to us for treatment are under our care for a limited period of the year only. They come here from year to year, which enables us to review the position at regular intervals, the result being that progression and retrogression in morbid processes, success or failure in treatment, make a deeper impression. A further advantage which we enjoy in our work in Harrogate is that we have the opportunity of studying cases which have been treated by different methods, by different physicians, in different countries, and many lessons are to be learnt from patients themselves.

Association of Oral Sepsis and Constitutional Conditions.

I wish now to quote a few brief notes of several cases illustrative of the association between oral sepsis and constitutional conditions. I had no difficulty in laying my hands upon the notes, because all these cases made a deep impression, standing out as peaks in my clinical experience.

CASE 1.—A male, aged 26, with a history of acute pain for three months in the metacarpo-phalangeal joint of right index finger. He was of good build and physique, led a healthy outdoor life, and had never known a day's illness. He was unable to write save for a short time only, and when he came to see me had his hand on a splint. The affected joint showed all the clinical signs of inflammation; no evidence of involvement of any other joint. Mouth appeared healthy, but the dental surgeon reported presence of one devitalised tooth. On my advice this was removed; within three days all inflammatory symptoms had disappeared from the joint. I saw nothing of this patient for 12 months; he then returned with precisely the same signs and symptoms in the same joint. Removal of a second devitalised tooth acted in the same way as on the first occasion, and I heard later from the patient that he was quite free from all trouble.

CASE 2.—A male, aged 45, with loss of power in upper extremities, chiefly in the hands. He had in both arms boring pains, which became worse at night, and at intervals sensory disturbances, particularly "pins and needles," in one or both hands. This nerve disturbance had been attributed to glycosuria from which he had suffered for some years. He was a debilitated subject, had worked hard in a City office, and looked and felt ill. Examination of mouth revealed the presence of a number of septic stumps, and marked gingivitis. I advised clearance of the mouth; within a few weeks pain and weakness in the arms had disappeared; further, there was a surprising reduction in the glycosuria—an observation which has stood me in good stead many times since.

CASE 3.—A female, aged 46, had enjoyed good health all her life save for present subacute rheumatism, from which she had suffered for nine months. The greater part of the time she had been confined to her bed; nightly temperature between 99°-100° F., pulse-rate 100-110. Began with pain in muscles of upper extremities; joints of both arms and legs then became involved. Prolonged fever, loss of sleep, and pain was beginning to tell on patient; heart muscle showed signs of enfeeblement. Severe gingivitis present round six or eight stumps, with which she parted reluctantly. Within 48 hours temperature and pulse-rate became normal; within a week patient was quite free from pain, and in a comparatively short time she was able to return home in an ordinary compartment instead of by invalid saloon, in which she came. A year later this patient again came under my care, having remained quite well for six months; since then a recurrence of pain and swelling of knee-joints. The mouth was completely cleared on this occasion. Patient wrote later, giving a good report of her condition.

CASE 4.—A male, aged 68, with an anomalous skin eruption which had been present for three weeks. Numerous small vesicles and pustules on body, neck, face, and arms, and raised red blotches on hands and other parts of body. Repeated crops of ulcers on tongue and lips prevented his taking solid food for three weeks. During previous summer he had been troubled with gums and throat, for which he had undergone a course of vaccine therapy. Gums, teeth, tongue, fauces, and pharynx were acutely inflamed: a well-marked example of profound and generalised oral sepsis. Blood picture was one of pernicious anæmia, although degree of anæmia was not extreme. Further blood examination made at an interval of 10 days showed a reduction of red blood cells from 3,400,000 to 2,800,000. Culture from gums gave an abundant growth of streptococci; urine culturally negative, and incubation of a swab on agar from a pustule for 48 hours gave no result. Two or three days after his arrival the patient became febrile, and in spite of energetic local antiseptic treatment he died within a month from acute septicæmia. I believe it to be a well-recognised clinical fact that there is a special malignity in streptococcal infections involving bony cavities and bone substance.

Further Conditions found in Association with Oral Sepsis.

If time permitted I could give you notes of many other cases that have passed through my hands—some complete successes, others partial, through recognition of oral sepsis as the causative factor of the condition. The business man in the "forties," whose only complaint is that he does not feel fit, is tired after his game of golf, and has lost the sense of physical well-being—dyspeptics of various types, and in this last group we have perhaps allowed our minds to dwell on the element of unsatisfactory mastication and not sufficiently on the toxæmic element. I believe ophthalmologists will tell us what my limited experience has taught me, that in very many ocular conditions—e.g., cases of iritis, iridocyclitis, and retrobulbar optic neuritis—the cause is to be found in the mouth, and the cure is the work of the dental surgeon. This is not to be wondered at when we consider the close association regarding blood-supply between the teeth of the upper jaw and of the structures in the orbit via the pterygoid plexus.

I have quoted one case of acute septicæmia, and could quote many others of less important pyogenic infections due to oral sepsis—e.g., cases of recurrent boils and abscesses. From the successes which I have achieved in several cases of intractable urticaria I am sure it is wise to eliminate the possibility of dental infection in this condition. Fibrositis, so prevalent that we are perhaps entitled to look upon it as a British disease, is not entirely due to the dampness and chilliness of our sea-girt isles, but is oftentimes due to a toxæmia from the same source. Shall we not have to modify our views to explain the high incidence of another peculiarly British institution—acute and chronic gout—recognising that we must reckon with a mild degree of sepsis as, at any rate, a factor? A number of writers in the medical press, particularly in America, have drawn attention recently to the rôle of oral sepsis in hyperthyroidism. I have recently had under my care a lady suffering from this condition in its early stages, for whom I thought of prescribing a course of radiotherapy, but after oral care she improved

[1] Being the opening paper read at a discussion at the Harrogate Medical Society, Nov. 18th, 1920.

so rapidly that I have reason to believe that no further treatment will be necessary.

So far I have spoken of successes, complete and partial, but I have to record many failures. A number of people are to-day either wholly or partially edentulous on my advice, with no apparent advantage; and how many others there are in the same condition who tell the same dismal story after following the advice given to them by other physicians. There is, however, another side to the picture, as I have on several occasions, as a result of the subsequent history, had to regret not having advised radical treatment in the first instance; a case to illustrate this I purpose quoting shortly.

Chronic Focal Apical Infection.

It is not my intention, however, to roam over the entire field of oral sepsis, but to draw your particular attention to one special part of the problem, that of chronic focal apical infection. The hypothesis on which I worked till a few months ago was that systemic infection from oral sepsis was chiefly due to the swallowing of countless milliards of pyogenic organisms. Eventually the time arrived, possibly on account of an enhanced dosage, or to diminished resistance on the part of the gastric secretions, when the bactericidal action of the gastric juice became inadequate, and so live pyogenic organisms found a foothold in the gastro-intestinal mucosa. My view was that in those cases in which satisfactory results did not follow oral treatment the probable explanation was that the stable door had been shut after the horse had gone, that the *Streptococcus oris* had taken up its abode in the colon, its cultural characteristics no doubt changing in course of time through correspondence with its new environment.

I fully recognised the possibility of a generalised infection from the buccal cavity, but felt that this did not altogether "fill the bill." The first case which I have quoted did not satisfactorily fit in with this conception of the morbid pathological process, and I now purpose giving some details of a further case which to me was very instructive, and in which I was sorry that radical treatment had not been adopted at the commencement.

CASE 5.—In the summer of 1915 a lady in the late twenties consulted me on account of considerable swelling of three of her finger-joints, probably periarticular, and possibly with fluid present. For some months she had been subject at times to swellings, accompanied with pain in finger- and toe-joints. Her dental surgeon and physician in London were in agreement that the condition of her mouth was perfect. I examined her mouth carefully and found everything satisfactory. She was proud of her teeth, had paid unusual attention to the question of oral hygiene, and had never had toothache. Tonsils and naso-pharynx healthy, general health and personal medical history good. On the three or four occasions that I saw her I noted that she had a slight rise in temperature—99 to 99·5°—with quickened pulse, which naturally made one search the more diligently for a focal infection. On my advice she again saw her dental surgeon and took a further opinion, which again corroborated our findings. In the summer of 1916 I saw her again; her general health was becoming impaired; the inflammatory changes had progressed in joints originally affected, and fresh joints had become involved. She sought further advice from a third dental surgeon, who cleared the mouth, and later she had a course of treatment with an autogenous streptococcal vaccine. For a few weeks after this operative procedure the patient was gravely ill, since which time no fresh joint lesions have appeared.

This case illustrates the danger which is run by undertaking the surgical treatment of too many foci at the same time. Had the teeth been removed gradually, absorption of toxic material would have been spread over a longer period, with much less risk of constitutional disturbance.

Dental Radiography.

Last winter I visited some of the great clinics and a number of the smaller hospitals in the United States of America. I was much impressed with the position that dental radiography occupies in that great country. Some of the most stimulating hours of my life were spent at Rochester, Minnesota, in the society of Dr. Charles Mayo. He took me first to the dental radiographic department of the Mayo Clinic; there I found that a radiographic examination of the teeth formed part of the routine examination of the patient. In the past few years I had occasionally seen dental radiograms, but must confess I could make but little of them; nor did I receive much enlightenment regarding them from my dental surgeon colleagues. After seeing a few hundreds in America, I found no difficulty in interpretation, and began to realise their great value for diagnostic purposes. My attention was particularly directed to the question of chronic apical infection from a radiographic standpoint. As a result of the infective process there is a destruction of cancellous bone tissue at the site of the mischief, which is indicated in the accompanying radiograms by a light area. I learnt that if such a light area be discovered in the alveolar process at the apex of a devitalised tooth or about a root, it was possible on radiographic evidence alone to make the positive diagnosis of chronic apical infection; and, further, that with the elimination of the inflammatory process the cancellous tissue resumed its normal character and appearance.

FIG. 1.—Normal teeth.

FIG. 2.—Bridge work and infected roots.

FIG. 3—Large granuloma at the root of lower incisor tooth, associated with pyorrhœa and marked alveolar absorption in the incisor area.

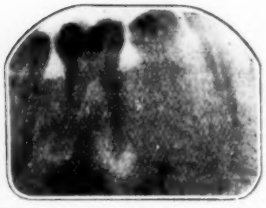

FIG. 4.—Lower molar tooth showing typical granuloma at each root.

FIG. 5.—Gross infection around the roots of teeth.

FIG. 6.—Gross infection around the roots of teeth.

FIG. 7.—Granuloma at the root of tooth with filled dental canal.

Dr. Charles Mayo arranged for me to have an interview with Professor E. C. Rosenow, to whom the medical profession owes a debt of gratitude for much original work, by no means the least important of which has been his bacteriological studies of dental infection. He demonstrated to me his methods of cultivation, also many micro-photographs of granulomata near the apices of extracted teeth, showing bacteria lying in close proximity to blood-vessels. From a study of these it was easy to see that bacteria have no difficulty in passing straight into the blood or lymph streams, and that, in consequence, chronic apical infection from a theoretical standpoint is the most dangerous of all forms of oral sepsis. I had been mistaken in my view that the harm lies in the swallowing of pyogenic organisms, and learnt that the chief danger arises from direct absorption into the blood stream of bacteria and their toxins. Moreover, this menace is the more serious because it usually gives rise to no symptoms and no pus formation. I now began to see daylight. Had the patient whose case I last quoted been radiographed in the first instance, a method of investigation of which neither her dental surgeons nor I had availed ourselves, a correct diagnosis of chronic apical infection could have been made, and I think I am justified in saying that with proper treatment her joint symptoms would soon have disappeared, before grave organic change had supervened.

Elective Localisation of Bacteria.

I can do no more than refer to Rosenow's work on the elective localisation of bacteria. I venture to quote one of his cases dealing as it does with a condition with which we have to deal so frequently. A middle-aged physician had repeated attacks of pain in the right gluteus maximus muscle and stiffness of the muscles of the back. A granuloma was found over the apex of the root of an extracted tooth, which on cultivation gave a short-chained green-producing streptococcus, a few hæmolytic streptococci, and a moderate number of slightly hæmolysing streptococci. A rabbit was injected intravenously with the growth, and at the necropsy the right gluteus maximus muscle was found to be hæmorrhagic, and there were a moderate number of lesions in the more tendinous portions of the muscles throughout the body. Rosenow quotes, among others, cases of myelitis, iritis, multiple neuritis, and arthritis, which pathological changes he has been successful in reproducing in rabbits by intravenous injections of cultures from granulomata found at the apices of teeth in patients suffering from these conditions.

It is obvious that our only hope for a really successful issue, in dealing with cases of systemic infection from oral sepsis, is to attack at the very beginning of the morbid process. To be logical, one should first consider the problem as to how apical infection takes place, whether via the periodontal membrane, the dental pulp, or the blood stream; but the consideration of the ætiology and prevention of the condition is one for the dental pathologist, and does not fall within the scope of this paper.

Is Simple Extraction Adequate?

With a patient suffering from a systemic disease in which an infection at the apex of one or more teeth is discovered, What is the correct treatment from a dental surgical standpoint? Rosenow teaches that simple extraction is not adequate, and that persons who have had all their teeth extracted may still harbour localised areas of infection in the jaws. May not this be the explanation of some of the failures to which I have already referred, the apical or periodontal infection having been left or only partially removed? I am, of course, referring to cases in which there is no other manifest focus of infection in the tonsils, naso-pharynx, accessory sinuses, &c.; and let me add that it is rare to find infected tonsils without infected teeth being present at the same time. If the infinite capacity for taking pains be the correct criterion, my friend, Dr. B. S. Gardner, who is in charge of the dental department at the Mayo clinic, is a genius, because he takes no chance of not completely eliminating apical infections. It was my privilege to see him operate on a number of cases, all performed under conductive anæsthesia, which appeared to me to be most satisfactory alike to patient and surgeon. His practice in some cases is to make a half-inch round incision to cut loose a flap of the soft tissues, and so expose the alveolar plate which forms the labial wall of the socket of the affected tooth. A window is then made by removing the alveolar plate to uncover the infected area. The tooth is then extracted, and granulation tissue removed with a curette until healthy bone is visible on all sides. After the cavity has been washed out with an antiseptic solution the flap is drawn down and sewn into position carefully with horsehair stitches.

Analysis of Seventy Cases Investigated by Means of Dental Radiography.

During the past six months I have utilised dental radiography in the investigation of 70 cases in which the consideration of the personal history and clinical findings led me to believe that help in diagnosis might be forthcoming. The greater proportion of these, 31, were cases of fibrositis; in 23, definite apical infection was revealed, and of the 23, in 13, the condition was associated with rarefying osteitis in the neighbouring alveolus, 2 showed rarefying osteitis only, leaving 6 in which no changes were observable on the dental films. Six out of 10 cases of neuritis showed apical infection, 2 of these with rarefying osteitis in addition, and 1 with rarefying osteitis alone. Of 7 cases of arthritis 4 showed apical infection alone, and 2 apical infection with rarefying osteitis. In 13 patients suffering from general ill-health, with ill-defined dyspepsia, there was radiographic evidence of dental trouble in all—7 had apical infection alone, 2 apical infection and rarefying osteitis, and 4 rarefying osteitis alone. In one case of kerato-cyclitis there was gross apical infection; in one case of alopecia, in which a dermatologist suspected the presence of a focal infection, radiography revealed some buried roots with granulomata; in one case of urticaria giganta gross apical infection was revealed, involving several teeth, together with rarefying osteitis. One case of trigeminal neuralgia, probably due to the presence of a buried root in the upper jaw, was undiagnosable save by radiography. One case of persistent pyrexia disappeared after the removal of infected teeth and tonsils. In 3 cases of general toxæmia of unknown origin and in 2 unclassified cases of no importance there was gross apical infection.

I now purpose giving a few details of 8 of this series of 70 cases which received dental surgical treatment while under my care.

CASE 6.—A young man suffering from neuritis of some months' standing, involving left upper extremity, had complete relief from pain three or four days after removal of offending teeth, with curettage of sockets. Radiographic diagnosis—apical granuloma.

CASE 7.—A male, aged 59, with fibrositis, chiefly confined to cervical and lumbar muscles, had suffered pain in consequence for six months. Nodules to be felt in affected muscles; evidence of synovial change in both shoulder-joints. Radiographic examination revealed gross apical infection of second right incisor and left bicuspid in the upper jaw, no pyorrhœa being present. Cultural examination of an extracted tooth yielded a pure growth of a hæmolytic streptococcus, from which an autogenous vaccine was prepared.

CASE 8.—A female, aged 34, with history of two attacks of rheumatic fever at ages of 8 and 28. Systolic bruits heard at both the mitral and aortic orifices, but no cardiac symptoms. For the past two years she had complained of muscular pains. Visible portion of teeth appeared sound; slight apical infection reported at apex of one tooth in upper jaw, and a large infection at apex of a second tooth in lower jaw; no pyorrhœa. Cultural examination of extracted teeth gave a pure luxuriant growth of a hæmolytic streptococcus; an autogenous vaccine was administered, and I hear she is now quite free from her muscular pains.

CASE 9.—A male, aged 40, who had complained of gastric discomfort, general ill-health, and slackness for two or three years; granulomata discovered around apices of most of his teeth. I advised complete extraction with curettage of sockets; notwithstanding his edentulous condition gastric symptoms speedily disappeared, with marked improvement in general health and increase in body-weight.

CASE 10.—A female, aged 56, had suffered for many years from repeated attacks of kerato-cyclitis. On the advice of an oculist she had seen her dental surgeon on many occasions, but he had always reported that her mouth was above suspicion. Apical infection was present at root of one tooth; the socket was opened by the alveolar route already described. Granulomatous material was removed, which bacteriologically after 48 hours gave a free growth of a Gram-positive diplococcus.

CASE 11.—A male, aged 34, gave in May, 1920, a history of pain in his feet for some weeks in 1917 and at intervals since. Since November, 1919, he had suffered from severe pain in both hands and feet; poor general health obvious. Fusiform swellings of inter-phalangeal joints of hands feet puffy clinically the picture was one of the œdematous type of early arthritis. Radiographic

examination of right hand and foot showed inflammatory changes at present mainly confined to soft parts—i.e., periarticular; but there was evidence of wasting of bone in neighbourhood of articular surfaces. Visible portions of teeth appeared healthy, but by radiographic observation large granulomata seen at roots of a lower left molar, with absorption of root apices (vide Fig. 4). On digital pressure of tonsils yellow, offensive concretions were extruded. Tonsils were enucleated and the offending tooth extracted with curettage of socket. Tonsils on external examination showed numerous follicles, and on section pockets containing greenish pus. On cultural examination of tonsils a pure growth of a short-chained streptococcus was obtained; and cultural examination of tooth gave a pure growth of same organism. In a recent letter from his doctor I hear there is considerable improvement in general health, the weight having increased 15 lb. He says: "The feet are much better, and he walks quite decently now. The fingers are better, but still far from normal; the thickening over the terminal inter-phalangeal joints has gone, but the first inter-phalangeal joint, especially the first right finger, is very pronounced."

CASE 12.—A male, aged 42, gave in April, 1920, a history of general ill-health since 1916, and of a severe and prolonged attack of iridocyclitis in 1919. During this attack, a streptococcus was isolated from the urine, and a vaccine prepared from this source had proved of service. Mouth appeared healthy; but in upper jaw there was evidence of gross apical infection involving four teeth. Cultural examination of these teeth gave a luxuriant growth of a streptococcus, and a course of vaccine therapy, following removal of the septic foci, had most beneficial results.

CASE 13.—A male, aged 53, at present under my care, first consulted me five years ago on account of fibrositis, which I considered at that time was probably traumatic in origin. I saw him again in June, 1920; he gave a history of good health in intervening period. Nine weeks previously a window came down on his fingers and tore off the nails, since when he had had "rheumatic" pains in upper and lower extremities and lumbar area. General health was good; he took a good deal of exercise notwithstanding his muscular discomfort. There was much gold crown and bridge work in his mouth, and radiographic examination showed gross infection at the apices of four teeth. All forms of bath treatment exaggerated the symptoms, which gradually became more severe, finally confining him to bed, and necessitating the exhibition of opiates to relieve. He came under my care a month ago, and it was evident that there had been deterioration in his general health. Blood examination showed marked secondary anæmia, the hæmoglobin being 48 per cent only, but no evidence of pernicious anæmia. Wassermann reaction, negative. Blood culture, sterile. Cultural examination of the urine gave a short non-hæmolytic streptococcus. I advised removal of the four infected teeth one at a time, followed by curettage. After each extraction patient was ill for four or five days with febrile disturbance and exacerbation of his rheumatic pains. Cultural examination of all the teeth gave a free growth of streptococci of two strains—(1) a hæmolytic streptococcus; (2) a non-hæmolytic streptococcus. Since removal of these foci patient is steadily improving and I believe the prognosis is favourable.

In all these eight cases the radiographic findings were confirmed, and every tooth (all teeth were removed with meticulous care to avoid contamination from the mouth) submitted to bacteriological examination gave a growth of pyogenic organisms. As far as the series of 70 cases is concerned, this report must of necessity be looked upon as a preliminary communication, owing to the recent nature of the work detailed. My experience is so small that it would be unwise for me to dogmatise, and to say, for example, that apical infection was the "fons et origo mali" in every case in which it was discovered. At the same time that experience has been large enough to convince me that apical infection is frequently the cause of constitutional disease, which may be prevented or cured, particularly if recognised at an early stage.

It seems that a new conception of oral sepsis must revolutionise dental practice. Our dental surgeons have attained a high degree of skill in preserving the visible portion of the teeth; they have concentrated their energies almost entirely towards their preservation for masticatory and cosmetic purposes. A well-known American writer gives it as his considered opinion that the degree of oral sepsis is in direct proportion to the amount of mechanical work in the mouth. One has often admired the mechanical skill of the dental surgeon revealed in beautiful bridge work, crowns, fillings, &c.; yet the whole has sometimes to be scrapped in order to give their host health. For some time past I have questioned whether a devitalised tooth should ever be left in the head, and am now sure that it should not unless apical infection has been excluded by radiographic examination repeated at stated intervals. The dental surgeon will in the future visualise his work primarily from the standpoint of oral sepsis. He will consider the mouth as a gateway of disease, and himself as the keeper of the gate.

Thanks are due to my colleagues, Dr. Sinclair Miller, D.S.O., for the pathological examinations, and to Dr. C. W. S. Saberton and Dr. C. G. Hitchcock for radiographic help.

EXPERIMENTS WITH THE FLOCCULATION TEST (SACHS-GEORGI) FOR SYPHILIS.

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SOON after Wassermann introduced his reaction it was shown by numerous workers that the extract of spirochætes (syphilitic liver) which was used as antigen could be replaced by certain lipoid substances,[1] and that the reaction was not therefore necessarily a genuine antigen-antibody reaction. Further work afforded evidence that the reaction was of a physical kind,[2] and that the reacting power of the serum seemed to lie in the globulin fraction;[3] in addition it was shown that syphilitic sera possessed, to a greater degree than normal sera, the power of producing precipitates when left in contact with certain lipoidal emulsions under certain conditions.[4] It has for many years been a well-established fact that there is an optimum turbidity of the antigen for the production of the Wassermann reaction,[2] that is, a physical state when there is an optimum total surface of the suspended lipoids,[5] a fact which is taken as strong evidence of the physical nature of the reaction. The prevailing view of the Wassermann reaction may be summarised as follows: that the reaction is of a physico-chemical nature, and that there occurs a precipitation of the globulin of the syphilitic serum by the lipoidal colloids of the antigen with adsorption of the complement by this precipitate.[5 6] It is suggested that fixation of complement does not occur in the absence of such precipitation or flocculation, even though at the time the reaction takes place flocculation is not demonstrable to the naked eye, but convincing experimental proof on the point is still lacking.

Attempts to Replace the Wassermann Test.

On this assumption attempts have been made to replace the very complex Wassermann reaction by one in which a visible flocculation could serve as evidence of the syphilitic nature of the serum and render unnecessary the measurement of the amount of complement fixed by the protein-lipoid mixture. Of these various attempts the most successful up to the present time appears to be that advocated by Sachs and Georgi,[7] and the method is known in Germany under the name of the Sachs-Georgi test.

Sachs and Georgi[8] made use of the mixture of heart extract and cholesterin,[7] which is widely used in this country as the antigen in the Wassermann reaction, and mixing this with the diluted serum in certain proportions they noted the production or not of a flocculus after incubating the tube for two hours at 37° C., and then leaving at room temperature overnight. They claimed for this method great reliability in the distinction of syphilitic from non-syphilitic sera, a greater reliability, indeed, than they allowed to the Wassermann test itself. A large number of other workers have recently applied the method with conflicting results; some agreed as to the reliability of the reaction, while others found that the methods failed to give positive reactions in many cases which were syphilitic, and that false positives were given in other conditions, as, for example, in tuberculosis. Sachs and Georgi,[9] in a second paper, admitted that they had claimed too high a degree of accuracy for the test, but stated that with an increase in the length of incubation the false positives could be eliminated. They now suggested that the test should not be used to supplant the Wassermann test, but rather to supplement it. Other workers have also found this modification of the reaction to give more reliable results, and since its introduction the bulk of opinion in Germany has been in favour of the accuracy of the test. It is evident, however, that the experience of a very large number of workers must be collected before a reliable estimate of its accuracy can be made, and the time has not yet arrived for the collection of this evidence; the amount of work on this reaction which has been carried on outside Germany is up to the present very small.

Results of Experiments with the Flocculation Test, using Different Strengths of Emulsion.

Series.	Lipoidal emulsion.	Physical state of emulsion.	Time in hours. Temp. 37°C.	Total sera.	Sera giving strong positive W.R.				Sera giving weak or doubtful (Dbt.) positive W.R.				Sera giving negative W.R.			
					Total	Pos. S.G.	Dbt. S.G.	Neg. S.G.	Total	Pos. S.G.	Dbt. S.G.	Neg. S.G.	Total	Pos. S.G.	Dbt. S.G.	Neg. S.G.
I.	B.	Opalescent.	2 + 20 R.T.	65	25	18	2	5	6	0	0	6	34	4	0	30
II. 1*a*	B.	,,	20	43	16	11	0	5	7	0	0	7	20	1	0	19
II. 1*b*	B.	,,	48	43	16	15	0	1	7	1	1	5	20	0	5	15
II. 2*a*	H.	Slightly turbid.	20	43	16	15	0	1	7	2	0	5	20	2	1	17
II. 2*b*	H.	,,	48	43	16	15	0	1	7	6	0	1	20	5	6	9
III. 1*a*	B.	Opalescent.	20	83	26	13	3	10	23	0	0	23	34	0	0	34
III. 1*b*	B.	,,	44	83	26	16	2	8	23	1	0	22	34	0	1	33
III. 2*a*	H.	Slightly turbid.	20	85	26	19	2	5	25	4	5	16	34	0	0	34
III. 2*b*	H.	,,	44	85	26	19	3	4	25	7	10	18	34	1	4	29
IV. 1*a*	H.	Mod. turbid.	40	49	19	15	4	19	5	2	1	2	25	2	2	21
IV. 1*b*	H.	,,	68	49	19	18	1	0	5	3	1	1	25	4	7	14
V.	H.	,,	24	73	21	10	4	7	9	0	3	7	45	0	5	40
VI.	H.	,,	14	60	19	13	2	4	15	2	3	10	26	1	5	19
VII. 1*a*	H.	Very turbid.	15½	82	21	15	5	1	11	0	1	10	50	0	2	48
VII. 1*b*	H.	,,	15½ + 24 R.T.	82	21	20	0	1	11	0	1	10	50	0	2	48
VII. 2*a*	H.	,,	15½ R.T.	78	20	0	0	20	11	0	0	11	47	0	0	47
VII. 2*b*	H.	,,	15½ R.T. + 24	78	20	15	2	3	11	0	1	10	47	0	0	47
VIII. 1*a*	H.	,,	20	67	28	26	0	2	10	3	1	6	29	0	0	29
VIII. 1*b*	H.	,,	42	67	28	28	0	0	10	7	1	2	29	0	1	28
IX. 1*a*	H.	,,	15	55	27	27	0	27	13	13	0	0	15	15	0	0
IX. 1*b*	H.	,,	39	55	27	27	0	27	13	13	0	0	15	15	0	0
X. 1*a*	H.	,,	14	58	15	13	1	1	7	1	2	4	36	2	0	34
X. 1*b*	H.	,,	43	58	15	15	0	0	7	4	0	3	36	11	2	23
XI. 1*a*	H.	Opalescent, faintly turbid.	15	51	16	12	0	4	10	0	0	10	25	0	0	25
XI. 1*b*	H.	,,	43	,,	,,	14	0	2	,,	0	0	10	,,	0	0	25
XI. 2*a*	H.	Mod. turbid.	15	,,	,,	14	2	0	,,	0	0	10	,,	0	0	25
XI. 2*b*	H.	,,	43	,,	,,	15	0	1	,,	0	0	10	,,	0	0	25
XI. 3*a*	H.	Very turbid.	15	,,	,,	15	1	0	,,	0	1	9	,,	0	0	25
XI. 3*b*	H.	,,	43	,,	,,	15	0	1	,,	0	0	10	,,	0	0	25
XI. 4*a*	H.	Max. turbidity obtainable.	15	,,	,,	14	2	0	,,	0	1	9	,,	0	0	25
XI. 4*b*	H.	,,	43	,,	,,	15	0	1	,,	0	0	10	,,	0	0	25

The main results are here shown. "B." signifies an extract prepared from bullock's heart, while "H." is that prepared from human heart. "R.T." signifies room temperature.

Technique.

The lipoidal mixture used by Sachs and Georgi is prepared as follows:—

An alcoholic extract of bullock's heart is made, using 1 g. of heart muscle to each 5 c.cm. of 96 per cent. alcohol; 100 c.cm. of this heart extract is mixed with 200 c.cm. of 96 per cent. alcohol and 13 c.cm. of 1 per cent. cholesterin (alcoholic solution). This cholesterinised extract is diluted with normal saline, just before the test, in the following way. To 1 volume of the mixture 1 volume of normal saline is rapidly added, and then 4 volumes of saline added more slowly in such a way as to make an emulsion which is opalescent but not turbid. The serum of the patient inactivated at about 55° C., as for the Wassermann test, is diluted 1 in 10 with normal saline, and to 1 c.cm. of diluted serum is added 0·5 c.cm. of emulsion prepared in the manner described. In their original paper Sachs and Georgi recommended that the results should be read off at the end of two hours at 37° C., and 18–20 hours at room temperature, but in their later paper they recommend as yielding more reliable results leaving the tubes in the incubator for 18–20 hours and reading off immediately on removal therefrom. A positive reaction is one in which there is a flocculation or precipitation visible to the naked eye or with the aid of a hand-lens.

In the series of experiments here reported the following technique was used:—

The bullock's heart extract was prepared according to the above formula, the minced meat being shaken up with the alcohol but not ground in a mortar. The human heart extract was, however, prepared in a slightly different manner so as to use the extract from which the "antigen" used in the parallel Wassermann tests was prepared—that is, a 1 in 10 alcoholic extract of human heart muscle was used, the muscle being ground in a mortar with the alcohol; on the day of the test 20 parts of the extract were mixed with 10 parts of absolute alcohol and with 1·35 parts of 1 per cent. cholesterin (Poulenc frères). One part of this mixture was then diluted with 5 parts of saline so as to give varying degrees of density. It was never possible to produce an opalescent solution with this extract, the thinnest obtainable being slightly turbid.

Wassermann tests were conducted on all the sera by a method which is practically that of Harrison,[10] differing only in that the doses of complement used in the test are 4, 6, and 8, or 4 and 8, and that the volume of each constituent used is 0·2 c.cm.

A +++ (strong positive) represents eight doses or more of complement fixed, ++ (moderately strong positive) between six and eight doses, + (weak positive) between four and six, and ± (doubtful reaction) less than four but more than the negative controls. In every series of tests at least two negative controls and at least two strong positives in addition to other positives of different degrees were invariably used. Every precaution was taken to eliminate complement that was over-deviable and antigen that was too anticomplementary and which might have given false positives. In addition, every case included in this series had both its Wassermann and its Sachs-Georgi done by one worker (myself) from the same tube of serum (heated at 56° C. for 20 minutes), and with the exception of one series both tests were done on the same day. In every case venous blood has been used. The +++ may be taken with certainty to represent cases of syphilis, while the ++ and + were with extremely few exceptions obtained from early cases and cases under treatment. The ± reactions are not necessarily, though frequently, from latent or treated cases.

It was early apparent that opalescent emulsions such as Sachs-Georgi recommend give results in the interpretation of which there is room for important differences of opinion. The flocculation is so very delicate that many cases occur in which one is doubtful whether the reaction should be classed as positive or negative. Attempts were therefore made to modify the test in such a way that the flocculation in a strong positive case should be massive and unmistakable and at the same time to ensure that the negative cases should show no trace of flocculation. The conditions have, therefore, been varied so as to test different time and temperature readings, different cholesterinised extracts, and cholesterinised extracts prepared so as to be under different conditions of density.

Some sort of scale had to be drawn up to accommodate the readings to the use of the dense lipoidal extracts used in the later experiments, and the following standards were adopted for convenience in recording:—

+++ was used to represent complete clearing of the emulsion with the formation of large flocculi which usually come to the surface or adhere to the side of the tube; ++ represents a result in which there is clearing but in which the flocculi are more numerous but not so massive; + represents an appearance in which there is not complete clearing between smaller flocculi; ± represents the production of very small flocculi which are still visible to the naked eye; ∓ a flocculation which is only with certainty

distinguishable with the help of a hand-lens; and −, no visible change in the emulsion even with the help of a hand-lens. In the interpretation ± to +++ are reckoned as positive, that is those degrees of flocculation which can with certainty be determined by the naked eye; ∓ is classed as a doubtful reaction; and − as negative.

The number of different sera used was 686, and the number of different tests and readings 1882.

Discussion of Results.

In discussing the results obtained one may for convenience first take Series I. to V.

Emulsions.—Both the opalescent emulsion produced from the bullock's heart extract and the slightly or moderately turbid emulsion produced from the human heart extract showed fluctuations at different testings in the degree to which they yielded results comparable with those of the Wassermann tests; when tested side by side, as in Series II. and III., the opalescent emulsion gave results rather nearer to the Wassermann readings in Series II., but much less close in Series III. In addition, what it has not been possible to demonstrate in the table, the slightly or moderately turbid emulsion gave much more definite and more easily read results than did the opalescent emulsion. Although both emulsions on occasion yielded results very closely analogous to the Wassermann readings, both gave on other occasions results which materially differed, usually in the direction of missing undoubtedly syphilitic cases.

Time and temperature.—Here also the results were not perfectly consistent. The original Sachs-Georgi standard method of 2 hours at 37° C. followed by 20 hours at room temperature gave results in which a few positives were negative, and a few negatives positive; a reading at the end of 14 hours at 37° C. similarly showed results on the negative side; readings at the end of 24 hours at 37° C. gave, as a rule, results in which a few positives were missed, while readings at the end of 48 hours gave, as a rule, results tallying fairly closely with those of the Wassermann. At this later period, however, there was a tendency for negative Wassermann sera to give a weak positive Sachs-Georgi result.

In Series VII. to XI. turbid emulsions were used, the last series being one in which a set of emulsions of varying turbidity, prepared from the same extract, were tested side by side with the same set of sera. The results of these later experiments may be summarised as follows:—

Emulsion.—Where in the same series of tests emulsions of varying density were used (Series XI.) it was found that turbid emulsions gave better results than opalescent, but that greater degrees of turbidity beyond a certain minimum did not seem to produce a difference in the readings.

Time and temperature.—Readings at the end of 42 or 43 hours at 37° C. as a rule gave the most accurate results; readings at the end of 20 to 24 hours gave results usually slightly on the negative side; readings at the end of 15½ hours at room temperature gave results in which all the positives would be regarded as negative; readings at the end of so many hours at room temperature, followed by so many hours at 37° C., gave results less good than readings at the end of so many hours at 37° C. followed by so many hours at room temperature.

False positives.—One may now turn to Series IX., where false positives were yielded by all the negative sera. The reason for such a result is not yet definitely known, but it is significant that on this occasion, owing to the large number of tests which were being carried out, a batch of new tubes, which had been somewhat hurriedly washed, was pressed into service. As other factors in the reaction were the same as on other occasions, it is possible that the electrolytic conditions which play their part in the reaction had been on this occasion artificially produced. It will be seen that false positives were also given at the 43 hours' reading of Series X.

One may therefore add to the conclusions already made: under conditions as outlined, results can usually be obtained by the flocculation test, which approximate extremely closely to those of careful Wassermann tests, and in my hands the most accurate and most easily read were obtained when turbid emulsions were used rather than the opalescent solutions advocated by Sachs and Georgi, and when a considerably longer period of incubation was made use of than their standard time of 18 to 20 hours. It must be admitted, on the other hand, that the series of false positives already referred to occurred when these thick emulsions were being used, and it is possible that the increase in the surface of the suspended lipoids carries with its advantages this particular danger. I believe, however, that on this occasion the cleaning of the glassware had been insufficient. When opalescent solutions are used, the readings seem to me to be too difficult and too liable to cause the introduction of a personal element, and for this reason it is desirable that the comparatively gross flocculation seen with the thicker emulsions should be aimed at in standardising the test. Until the factors which may cause false reactions are definitely recognised and can be controlled the test should not be used to supplant the Wassermann reaction, although it may profitably be used as an additional control to that test. Even when used in this way at least half a dozen negative and half a dozen positive controls should always be included. Further experiments into the nature of the reaction are in progress.

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A CASE OF ENTERIC FEVER DUE TO THE B. ENTERITIDIS OF GAERTNER.

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THE following is a report of a case running a course simulating in many respects that of a case of typhoid fever, but due in all probability to infection with the *Bacillus enteritidis* of Gaertner. We feel constrained to publish it, not merely because it presents features of inherent bacteriological interest, but because it appears to be a unique case of its kind. Not that infection with the *B. enteritidis* of Gaertner is uncommon, but infection with this organism, occurring in a sporadic form, unassociated with other cases, having no demonstrable relation to food-poisoning, and running a course so closely similar to that of typhoid fever, appears to be unrecorded. Savage,[1] for instance, has collected the details of no less than 19 outbreaks of food-poisoning, shown more or less conclusively to have been due to the *B. enteritidis* of Gaertner, but amongst these there does not appear to be a single instance of a case running a typical typhoid course, such as the one we are about to describe. Bainbridge,[2] it is true, in his Milroy lectures in 1912 stated that "the illness following the consumption of meat infected with Gaertner's bacillus or *B. suipestifer* may take the form of pyrexia, lasting two to three weeks," but he quotes no instances in support of this statement, nor does he mention whether such cases are sporadic or merely associated with outbreaks of food-poisoning. It is the two points, the typhoid-like course and the sporadic nature of the infection, upon which we desire to lay special emphasis. Undoubtedly there have been some rather anomalous cases of infection with the *B. enteritidis*, and perhaps it would be advisable to give a short résumé of such as we have been able to collect from the literature.

Anomalous Cases of Infection.

Dean,[3] in 1911, reported a case of cholecystitis with gall-stones in a woman, aged 61, in which the *B. enteritidis* of Gaertner was isolated from the fluid in the gall-bladder, from a gall-stone, and from the fæces. The bacteriological findings were confirmed by serological and absorption tests. There was apparently no history of enteric fever or other illness which might be ascribed to the passage of the organism into the gall-bladder, so that in all probability it had gained entrance to the body without giving rise to marked symptoms.

Buchanan,[4] in a report to the Local Government Board, described an outbreak of food-poisoning at Mansfield following on the consumption of potted meat. Amongst the sufferers was a boy who had a prolonged illness without diarrhœa, was restless and feverish, delirious in the second week at night, wasted rapidly, ran a temperature of 101°–103° F., with a pulse of 120 and respirations of 30 a minute, had abdominal pain, some cough, frontal headache, slight enlargement of the spleen, and improved gradually after the fourth week. No definite bacteria were isolated and no agglutination tests of the boy's serum were performed. Possibly this may have been a case of infection with *B. enteritidis*, but, as apart from the finding of *B. proteus* in the potted meat no organisms of pathogenic importance were encountered, the exact nature of the case must remain in doubt.

Savage,[5] in an investigation of human fæces, isolated the *B. enteritidis* of Gaertner from the stools of a patient—age and sex not stated—who was clinically suffering from typhoid fever. The patient was admitted to hospital on the 28th day of illness; 12 days later—i.e., on the 40th day—a perforation of the intestine occurred; he was operated upon and died. On the 30th day the patient's serum agglutinated *B. typhosus* in a dilution of 1–200, and two strains of paratyphoid bacilli in a dilution of 1–100. On the 36th day the titre to *B. typhosus* was 1–600, to the paratyphoid bacilli 1–100. On the 38th day the stools were examined, and two organisms of the Gaertner group isolated; of these one was agglutinated by the patient's serum in a dilution of 1–100. This organism gave the biological reactions of the *B. enteritidis* of Gaertner, and was agglutinated to titre by a Gaertner serum. It is possible that this was a case of enteric fever due to the *B. typhosus*, and that by the time that the fæces were examined—that is, on the 38th day of illness—the organism had disappeared from the stools. The *B. enteritidis* isolated may have been introduced casually into the patient's intestine, or it is possible that it normally formed part of the intestinal flora, though both of these conditions appear to be extremely uncommon, as Savage himself has shown. If it is admitted, however, that the *B. enteritidis* was actually the cause of the illness, it is difficult to account for the agglutination results of the patient's serum; this serum rose in titre from the 30th to the 36th day from 1–200 to *B. typhosus* to 1–600, while the titre for the paratyphoid bacilli remained constant at 1–100. Unfortunately no absorption reaction was performed to see if the *B. enteritidis* isolated from the fæces would absorb the agglutinins for *B. typhosus* from the patient's serum. Further, as the patient's serum was not repeatedly tested against the *B. enteritidis*—indeed, from the account it seems doubtful if this was done at all—it does not appear justifiable to pronounce any definite opinion as to the exact nature of the infection.

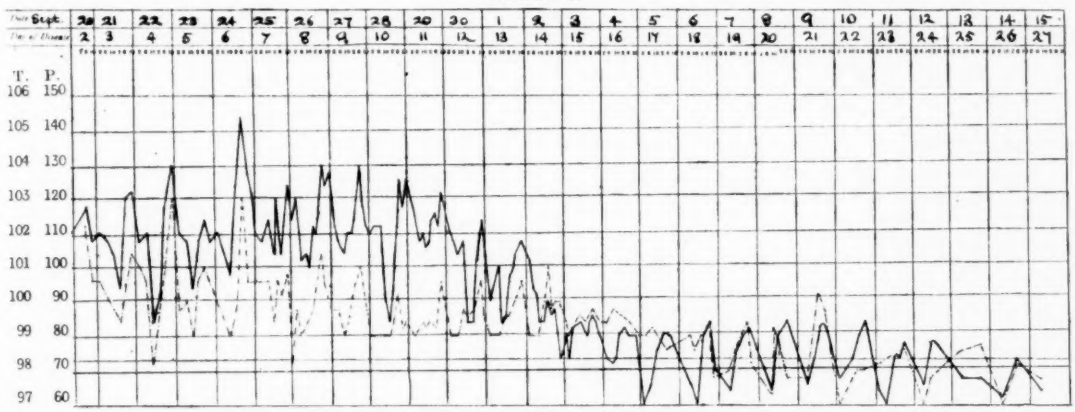
Savage,[6] in his recent book on "Food Poisoning and Food Infections," says that Batten and Forbes in 1908 described two cases of infection of infants with the *B. enteritidis* of Gaertner. The two patients suffered from diarrhœa and vomiting, with a considerable amount of pyrexia, the symptoms persisting for a number of weeks and ending fatally in both cases. No evidence was available as to the manner of infection. In the same book Savage,[7] when dealing with the symptomatology of food-poisoning, remarks that very occasionally cases with a protracted course are met with, the patients being ill for several weeks. However, these cases are met with in outbreaks of food-poisoning due to several different types of organism, and are obviously different from sporadic cases of infection with the *B. enteritidis*.

Description of Case.

The patient, Miss X, aged 23, who was temporarily acting as resident house physician, on awaking on Sunday morning, Sept. 19th, 1920, found herself to be suffering from a general feeling of malaise, together with a dry irritating cough. She got up and went about her duties. During the course of the day the cough continued incessantly, without, however, any expectoration of sputum. In the afternoon she went out to tea, and on returning in the evening felt hot and feverish. On taking her temperature she found it to be 100·4° F. After supper she took 30 grains of aspirin and then danced for an hour. Before going to bed at 10 P.M. her temperature had dropped to 99°. Sleep during the night was disturbed very badly by the cough. The following morning she was feeling distinctly worse, and as her temperature had risen to 102° she was admitted to one of the wards of the hospital. On admission the temperature was 102·8°, pulse 112, and respirations 28. The cough appeared to be somewhat looser, and a certain amount of mucoid expectoration was brought up.

Physical examination.—We are indebted to Dr. W. J. Fenton for the account of this examination, which was completely negative, except for the presence of an occasional rhonchus at the bases of the lungs. It was thought that the condition was probably one of influenza, of which there had been two or three cases amongst the nursing staff at that time.

CHART 1.



Showing the temperature (T.) curve as a continuous line and the pulse (P.) curve as an intermittent line.

During the next few days the temperature rose gradually, with marked morning remissions of 2° or 3° F., till by the 6th day of disease it had reached 103·4°; the pulse, on the other hand, gradually decreased in frequency till on the same day it was only 86; the respirations similarly decreased to 22 per minute. The cough had become looser and the expectoration, which was now more profuse, was mucopurulent in nature and sometimes tinged with blood; examination of the sputum for tubercle bacilli was negative. On auscultation of the lungs at this stage râles were heard at both bases, while scattered over the left base a large number of moist sounds were audible, which were taken to be evidence of patches of broncho-pneumonia. No dullness on percussion was demonstrable. During the first week the patient's appetite was fairly good, and she was able to take a semi-liquid diet without experiencing any discomfort. An expectorant mixture was given three times a day, together with inhalatio tereben. co.

The condition of the patient then became somewhat graver. The temperature oscillated between 101° F. in the morning and 104° in the evening, the pulse varied between 80 and 100, while the respirations rose to about 46. The facies of the patient, which had at first been bright and intelligent, assumed a dull, heavy, listless, apathetic appearance; the tongue was dry and heavily coated with fur; the lips were cracked and covered with sordes; at night there was low muttering delirium with purposeless movements of the fingers. No abdominal pain was complained of, the bowels were constipated and had to be relieved by enemata, and no enlargement of the spleen could be made out.

First agglutination test.—On Sept. 30th, the 12th day of illness, it was thought advisable to test the patient's serum for agglutinins to the enteric group. Accordingly, it was put up against *B. typhosus*, *B. paratyphosus A*, *B. paratyphosus B*, two strains of *B. paratyphosus C*, eight strains of *B. suipestifer*, and *B. enteritidis* of Gaertner. It failed to

agglutinate any of them in a dilution greater than 1-20, with the exception of *B. enteritidis*, which was agglutinated up to 1-160. The technique used for this and for subsequent agglutination experiments was a Dreyer's technique, modified only in that standardised agglutinable cultures were not employed, the tubes being incubated in a water-bath for two hours at 55° C, and read a quarter of an hour later.

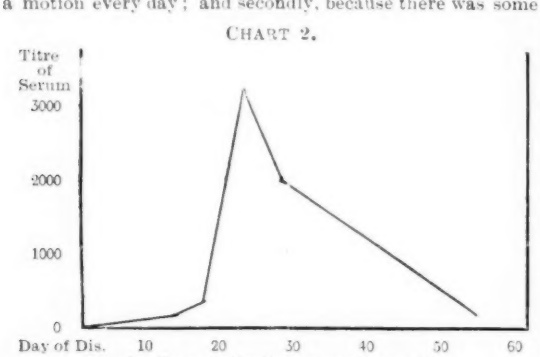
First Leucocyte count.—On the same day a differential white blood cell count gave the following figures:—

Total white blood corpuscles	11,062 per c.mm.
Polymorphonuclear leucocytes ...	88 per cent.
Small lymphocytes	9 ,,
Large lymphocytes	1 ,,
Eosinophiles	1 ,,
Basophiles	Nil.
Large hyalines	1 per cent.

On the same day a blood culture was also performed, but proved negative. On the 12th day the temperature began to fall, dropping to 99·4 while the pulse remained at 86, and the respirations decreased to 36 per minute. Simultaneously the appearance of the patient became brighter, the face lost its dull expression, and the tongue began to clear.

Second agglutination test.—On the 16th day of disease, when the patient was sitting propped up in bed, but still feeling very weak, the serum was tested again, and it was found that the titre to *B. enteritidis* had risen to 1-320. On the 14th day examination of the fæces and the urine for organisms of the enteric group was undertaken, the result being negative. The fæces were examined on five occasions during the rest of the time the patient was in hospital, but apart from the presence of *B. pyocyaneus* no non-lactose fermenters were isolated. The reason for not examining them every day was firstly, because the patient did not pass a motion every day; and secondly, because there was some

CHART 2.



Showing the agglutination curve of the patient.

misunderstanding over the collection of the specimens, leading to the failure of their transmission to the laboratory.

By the 14th day the temperature had dropped to normal, but remained swinging between 97° and 99° for the next ten days, when it finally became stable on the 25th day after the commencement of the illness. The pulse ranged between 68 and 84, while the respirations dropped to 20-24 per minute. Convalescence was extremely rapid, the patient by the end of the third week being able to sit up in bed, carry on an animated conversation, and take light solid articles of food.

Third agglutination test.—On Oct. 10th, the 22nd day of illness, the titre of the serum for *B. enteritidis* had risen to 1-3200.

Second leucocyte count.—Three days later a second count was performed, and showed:—

Total white blood corpuscles	8100 per c.cm.
Polymorphonuclear leucocytes	72 per cent.
Small lymphocytes	22 ,,
Large lymphocytes	1 ,,
Eosinophiles	3 ,,
Basophiles	1 ,,
Large hyalines	1 ,,

Fourth agglutination test.—On the 27th day of disease the titre of the patient's serum to *B. enteritidis* had fallen to 1-2000.

The patient got up on the 25th day for a short time, and was feeling so well that she was allowed to leave hospital on Oct. 15th, 27 days from the commencement of the attack. She was away for three weeks on the south coast. During that time she felt very weak, and suffered from occasional attacks of vomiting, coming on in the evening after exercise. There was no diarrhœa and the appetite was good. The patient bled herself on Nov. 2nd, but unfortunately the blood was delayed in transit, so that by the time it reached the laboratory it was in a state unfit for examination.

Fifth agglutination test.—On her return she was bled again, and her serum now agglutinated *B. enteritidis* only in a dilution of 1-160. Chart 2 shows the agglutination curve.

Diagnosis.

Making a résumé of the chief features of the case we have, then, (1) a fever lasting altogether 24 days and running a course simulating closely that of typhoid; (2) a very definite lowering of the pulse-temperature ratio, particularly noticeable when the pyrexia was at its height; (3) a moderate degree of toxæmia during the second week; (4) absence of a rash; and (5) no evidence of enlargement of the spleen. We do not consider the absence of the rash to be of great importance, as its presence is by no means constant, especially in cases of paratyphoid infection, while in connexion with the spleen, as a physical examination of the patient appears only to have been made infrequently, owing to her weak condition and the desire to disturb her as little as possible, and as it is recognised that the spleen may only be palpable for one or two days during the whole course of typhoid fever, we feel that it is impossible to exclude enlargement of this organ. Further, we can find no evidence to show that either a rash or enlargement of the spleen are at all common accompaniments of infection with the *B. enteritidis* of Gaertner. Certainly, in reviewing the literature of food-poisoning, one cannot help but be struck by the rarity with which these two symptoms are encountered.

A blood culture taken on the 12th day of disease was negative, and this, again, is a point on which too much stress cannot be laid, as by this time agglutinins had appeared in the blood, and as it seems possible that these may lead to the clumping of the bacilli in vivo and their subsequent removal from the blood by filtration in such organs as the liver, spleen, and kidneys, a positive result is hardly to be expected at this stage of the disease; in support of this we think we are justified in saying that the majority of pathologists will agree that the chances of obtaining a positive culture from the blood diminish every day after the end of the first week of illness.

The examination of the fæces and urine was likewise not undertaken till comparatively late in the disease—in fact, till the very day on which the temperature began to fall—so that here again negative findings are not of any great value. On the other hand, the characteristic agglutination curve, rising rapidly during the third week, falling sharply with the complete establishment of convalescence, and then coming down more slowly and remaining well above normal for at least seven weeks is a point which we consider to be of the greatest importance in the diagnosis of the disease. We realise, however, the incompleteness of the evidence necessary for the complete establishment of the nature of the case, and only regret that, as laboratory examination was not undertaken till the 12th day of illness, more extensive investigations were unable to be carried out.

Suggested Interpretations of the Case.

The following hypotheses suggest themselves as interpretations of the findings of the case:—

(1) The agglutination curve, though perfectly distinct, may have been in the nature of a pure freak—that is to say, that agglutinins to the *B. enteritidis* of Gaertner may be present in the serum of an individual (normal or diseased) who is not suffering from an infection with this organism. In this connexion we have been unable to find in the literature any account of an examination made with the object of estimating the normal agglutinin titre of human sera to *B. enteritidis*, such as has been carried out so fully in the case of *B. typhosus* and *B. dysenteriæ*, Flexner, and it is therefore impossible to exclude the fact that in certain individuals, under certain circumstances other than infection with the Gaertner bacillus, agglutinins for this organism may be present. But considering the number of agglutination tests which must have been performed against *B. enteritidis* in relation to the food-poisoning outbreaks, it would seem improbable that, if this hypothesis were true, it would not have been verified previously. It may be objected that the emulsion used for agglutination in this particular case was at fault. With the exception of the last test on the 53rd day after the commencement of the illness the same emulsion was employed throughout. The organism used was *B. enteritidis* of Gaertner, obtained from the Lister Institute, being

one of the strains with which Bainbridge worked in 1911 during his classification of the Gaertner group; it was grown in broth for 24 hours at 37° C., was then heated at 55° C. for one hour, and formalin added subsequently to the extent of 1 per cent. This emulsion was being used at the time very extensively by one of us (G. S. W.) while working out the relation of some organisms of the paratyphoid group, and though it was tested against a large number of sera, both rabbit and human, no instance of non-specific agglutination was encountered. Moreover, neither during the past 18 months, in which an extensive series of agglutination tests have been used with this strain, nor during the past few weeks in which it has been employed almost daily, have any anomalous cross-agglutinations been met with. Finally, both the saline and the normal rabbit serum controls, which were put up with each test, have proved consistently negative.

(2) The clumping of *B. enteritidis* may possibly have been due to heterologous agglutination, secondary to infection of the patient with an organism having an antigenic constitution similar to that of the Gaertner bacillus. As, however, no less than 13 other strains of the paratyphoid-Gaertner-suipestifer group were tested against the serum with negative results it is improbable that the infecting organism could have belonged to this group. In that case it must have been some entirely different bacterium, the serological reactions to which have not been worked out. However fantastic this may seem, we would recall the case of the Weil-Felix reaction in typhus fever, in which an apparently non-pathogenic proteus bacillus is agglutinated by the serum of a patient infected with an organism of undetermined nature. It would be unwise, however, to press this analogy too closely, as we remain completely in the dark as to its exact nature.

(3) The patient may have been previously infected with the *B. enteritidis*, and agglutinins against this organism formed in her blood. The occurrence of a pyrexial wave may then have stimulated the fresh production of these agglutinins, with the result that a distinct agglutination curve was produced. Garrow,[8] in a recent paper, has invoked this hypothesis, based upon a certain amount of experimental evidence, to explain the rise in agglutinin titre to organisms of the typhoid and paratyphoid groups which has been found to occur in undoubted cases of malaria and trench fever, the patients having previously received one or more injections of T.A.B. vaccine. Against this there are four salient facts: (*a*) there is no evidence of previous infection with the Gaertner bacillus, and a critical examination of the patient's past history failed to reveal any facts in favour of this possibility; (*b*) the patient had never had an injection of T.A.B. or other vaccine, so that group agglutination resulting from such an injection can definitely be rejected even if one were prepared to admit that the injection of such a vaccine could lead to the formation of agglutinins acting on the *B. enteritidis*; (*c*) the course of the disease was highly suggestive of enteric fever, and since, therefore, the clinical and bacteriological findings agreed closely with each other, the objection that the diagnosis was made on laboratory investigation alone cannot be maintained; and (*d*) there is no definite evidence in human beings to prove that a pyrexia of non-enteric nature is able to give rise in a patient who has previously suffered from an enteric infection or who has received a prophylactic dose of T.A.B. vaccine to an agglutination curve similar to that which results as a reaction to infection with an organism of the enteric group.

(4) The case was one of infection with the *B. enteritidis* of Gaertner, in favour of which is the definite agglutination curve, which has been found to be so characteristic of infections with organisms of the enteric group. We feel that in favour of this hypothesis is the vast amount of work which has been performed on this subject by Dreyer and the Oxford School—work which has both been confirmed and amplified by Topley, Platts, and Imrie[9] while investigating cases of undiagnosed pyrexia invalided from the Western front during the late war.

Method of Infection.

Accepting the diagnosis of Gaertner infection as correct, the question naturally arises as to how the patient became infected. At the time there was no case of enteric fever in the hospital, with the exception of one man who was suffering from a prolonged illness, shown to be due to infection with an organism of the Aertrycke mutton type. As the serum of this patient, however, showed no agglutinins to the *B. enteritidis*, it is quite improbable that there was any connexion between the two cases. Miss X had the majority of her meals in the residents' quarters, but a few had been taken outside. When she was first interrogated at the end of the second week of her illness she was unable to give any clear account of the food she had partaken of during the few days preceding the commencement of her symptoms, and therefore an examination of such food was out of the question. Nor could she remember having eaten any article of diet which had appeared to her to be in any way suspicious. A friend of hers—also resident in the hospital—who stated that she had had all her meals during the previous week with Miss X, admitted to having experienced a certain degree of malaise on the Sunday morning on which Miss X first felt ill, which continued for a few days before passing off, but as no definite symptoms were noticed, it would be unwise to regard this as more than a coincidence. None of the other resident staff nor any of the patients or nurses in hospital at the time manifested any evidence of food-poisoning, so that it would appear that the infection probably occurred outside the hospital.

If, however, infection had occurred through consumption of food in the hospital, four possible sources suggest themselves: (1) The food, when introduced into the hospital, may have been infected. Several examples of milk and meat containing the *B. enteritidis* of Gaertner have been reported; Zwick,[10] for instance, isolated a Gaertner bacillus from the milk of two cows suffering from acute mastitis, while Mohler and Buckley[11] recovered Gaertner bacilli from the fæces of a number of cows suffering from an enzoötic of enteritis, while Savage's extensive work on the subject has shown that infection of cows with the *B. enteritidis* is not altogether uncommon. However, this possibility is negatived by the fact that no symptoms of food-poisoning occurred in the other inmates of the hospital, as would almost certainly have happened if this had been true. (2) The cook, who prepared the food for residents, nurses, and patients, may have been a carrier of *B. enteritidis*, and thus have infected the food. If this were so, one would have expected other examples of food-poisoning to have occurred, which, as already mentioned, was not the case. Examination of this cook and her co-workers in the kitchen for evidence of infection was found to be impracticable, and as it seemed to be a most unlikely source, no further attention was devoted to this possibility. (3) The housemaid who carved the meat and served the food to the residents may have been a carrier, and may have infected one or two portions of food while engaged in its distribution; this might account for only one person being affected with symptoms of food-poisoning. To test this hypothesis the serum of the housemaid was taken and put up against the *B. enteritidis* of Gaertner and against one of the suipestifer group, but was found to be completely negative. (4) The food consumed by the patient may have received a chance infection from a fly, which had been in contact with Gaertner-containing material. By this means it is possible that only a small amount of food might have been contaminated—probably after it had been cooked—with the result that risk of infection would have been incurred by only one or two individuals, and as the infectivity of the *B. enteritidis* does not appear to be of a very high degree, unless it has multiplied in the food so as to be present in relatively large numbers or exists combined with a considerable amount of preformed toxin, it is quite reasonable to suppose that only such persons as presented a general lowering of resistance would be likely to succumb to the effects of invasion by the organism. In the very nature of the case it was impossible to prove the truth of such a hypothesis.

Previous Medical History of the Patient.

Having failed to find any definite evidence of infection, the past history of the patient was closely investigated,

and the following facts elucidated. Two years ago she had suffered from a severe attack of influenza when at Sheffield, at the time when this disease was manifesting a pandemic spread, during which she had run a high temperature for two to three weeks, accompanied by severe vomiting and hæmorrhages from the nose and mouth. Altogether she was in bed for five weeks, and had felt somewhat weak for a year afterwards. Last Christmas, when away in the country staying with her sister, who had returned from India after a prolonged attack of sprue, she had had another attack of fever, likewise diagnosed as influenza, starting with a high temperature and vomiting, which persisted for three or four days. A week after her recovery she was attacked with abdominal pain followed by diarrhœa with the passage of blood and mucus, which continued for nearly ten days before finally passing off; during this time the patient continued up and about, though feeling very weak. Since then she has had a slight degree of debility, and has been unable to take any violent exercise. It was thought possible that the patient might have been infected with an organism of the dysentery group from her sister, though the latter apparently never had anything to do with the preparation of the food in the house. To test this the serum of the patient was put up on Oct. 4th, the 16th day of her illness, against emulsions of *B. dysenteriæ*, Flexner, *V*, *W*, *X*, *Y*, *Z*, and against one of *B. dysenteriæ*, Shiga, but the agglutinations were all negative in a dilution of 1–50.

There yet remains the possibility that her sister may have been infected with the *B. enteritidis*, and from her Miss X had become infected with the resulting illness marked by abdominal pain and diarrhœa. Failing to rid herself entirely of the organism she had remained a carrier, and her recent illness might have been due to an exacerbation of the activity of this organism occurring while the patient was in a debilitated condition. Unfortunately, as her sister does not live in London it has not been possible as yet to procure a sample of her blood for examination, but if occasion offers this will certainly be done.

Summary.

(1) A case is reported of a patient suffering from pyrexia which simulated closely a typhoid course, but which was probably due to infection with the *B. enteritidis* of Gaertner. The case, moreover, was of a purely sporadic nature, and was unconnected with any co-existing outbreak of food-poisoning.

(2) It is suggested that it would be advisable in view of this case to test the sera of patients suffering from enteric-like infections against a more extended series of antigens than are commonly employed, in order to ascertain whether sporadic infections with organisms of the enteric group other than *B. typhosus*, *B. paratyphosus A*, and *B. paratyphosus B* are more than mere pathological entities.

It is with pleasure that we record our gratitude first of all to Dr. Fenton for his kind permission in allowing us to publish the case; secondly to Dr. W. W. C. Topley, director of the Institute of Pathology, Charing Cross Hospital Medical School, for giving us advice from his extensive bacteriological experience of cases of enteric infections; and, thirdly, to the clinical staff of the hospital for the help and facilities they afforded us.

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PSEUDO-COXALGIA:

OSTEO-CHONDRITIS DEFORMANS JUVENILIS.

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So little attention has been paid to the above affection in this country, except by orthopædic surgeons, that a brief description of what is known of the disease may be of interest, and may result in greater numbers of these cases being recognised and recorded. Since the appearance some ten years ago of the original papers dealing with the subject, by A. T. Legg in America, J. Calvé in France, and Perthes in Germany, little has been written on the subject in this country. Cases have been reported by R. C. Elmslie, D. P. D. Wilkie, H. H. Platt, E. M. Little, and the writer, while Mr. Muirhead Little published a short paper on this subject in the *Clinical Journal* in 1915. An exhaustive paper by Legg on the facts and theories to date may be found in *Surgery, Gynæcology, and Obstetrics* of the following year. The chief importance in recognising this condition lies in the difference between its prognosis and that of tuberculous hip disease, for which it is not uncommonly mistaken. Juvenile osteo-chondritis, which is by no means rare, affects children from 3½ to about 12 years of age, and males more commonly than females; it is usually unilateral, but may be bilateral.

Description of a Typical Case.

A healthy-looking child of, say, 6 years of age, of an active disposition and fond of games, begins to limp on one leg; perhaps there is a history of some antecedent fall on the hip, but not such as would raise a suspicion of any serious injury; the limp persists, and is accompanied by little or no pain. Eventually advice is sought, and examination reveals the following facts.

FIG. 1.—Tracing of skiagram of unilateral case of pseudo-coxalgia. Boy aged 5 years.

The position of the limb at rest is usually normal. There is slight wasting of the thigh and buttock, with resulting apparent prominence of the trochanter; some thickening of the neck of the femur, particularly on the inner side, may occasionally be felt; abduction of the hip is markedly limited or obliterated, while flexion remains free, almost, if not quite, to the normal limit; internal rotation and extension may be somewhat limited; at this stage there is no shortening, and rarely does the shortening amount to much. Trendelenburg's sign is usually positive. There is no pain on jarring the trochanter or heel. Skiagraphic examination reveals characteristic appearances: the epiphysis of the head of the femur is flattened from above downwards, irregular in outline and density, or even broken up into fragments; the epiphyseal line is less distinct than it should be, as if invaded by calcified tissue from both epiphysis and neck; the juxta-epiphyseal region of the neck is irregular and fluffy, and there may be clear semi-transparent areas adjacent to the epiphyseal line, more commonly at the upper angle of the neck; on the lower side the neck is thickened; the joint space is not diminished, showing that the cartilaginous head is little, if at all, distorted, but that the changes are

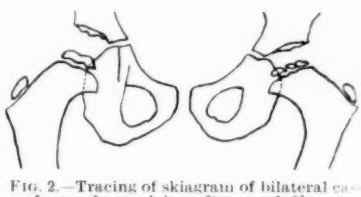

FIG. 2.—Tracing of skiagram of bilateral case of pseudo-coxalgia. Boy aged 6½ years. (Seen with Mr. O. Addison.)

rather in the ossific centre inside it; the pelvis may be asymmetrical, the affected side being slightly the smaller of the two; the acetabulum may show changes in the way of fluffiness and want of definition.

Progress, Treatment, and Ætiology.

The progress of the case is always towards recovery. Abscess formation and other complications seen in true hip disease never occur. Most writers agree in stating that treatment, or entire absence of treatment, has little, if any, effect on the ultimate result. Radiograms taken at intervals for one, two, or even three years show that after a time the ossification of the epiphysis returns to the normal, until at last the hemispherical shape of the ossific centre is restored. Finally, there may be some mushrooming of the head of the femur, so that the appearance would justify the diagnosis of one form of juvenile osteo-arthritis. The limp, usually slow in disappearing, is eventually lost. Spasm of muscles may occasionally be a feature in the early stages, when the diagnosis may be difficult. As a rule the diagnosis is easy.

Although treatment is said to have no effect, it is wiser to order a walking calliper splint to take the weight off the femur, while cases with an unusual amount of pain or spasm must be treated with complete rest and extension for a time. Muirhead Little advises abduction under anæsthesia and fixation in plaster, so that changes in the shape of the head that might limit abduction may be avoided.

As to the nature of the affection nothing definite is known. The theory which receives the greatest amount of support is that trauma produces damage to the blood-supply of the head of the femur, and that the changes in the ossification of the bone are secondary to this damage. Developmental error—as a predisposing if not the sole cause—local infection, and rickets have all been suggested in explanation of the appearances. Tubercle and syphilis can undoubtedly be ruled out of court. Suffice it to say that there are difficulties in the way of accepting the traumatic theory, but the discussion of this subject must be left for a subsequent publication elsewhere. Similar radiographic changes in an epiphysis are met with in other regions of the body.

A NOTE ON
SPIROCHÆTES IN THE ÆTIOLOGY OF CERTAIN PARALYSES.

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AT the suggestion of Professor E. E. Moravcsik, M.D., I started research in the parasitology and pathological tissues of general paralysis of the insane, at the Psychological and Neurological Clinic of the Royal Hungarian University of Budapest, soon after the publication of Noguchi's researches. The outbreak of war prevented me continuing this work, but I was able to resume it at the end of 1918. I include in this short contribution my more important observations on the presence of spirochætes in the central nervous system, before publishing a longer description of the cases treated in this clinic in view of their parasitological, clinical, and therapeutical applications. I also take the opportunity of reporting an interesting diagnosis in a case of disseminated sclerosis.

Levaditi, Marie, Bunkowsky, Moore before Jahnel, later Hauptmann have shown the presence of spirochætes in large quantities in the cortex of patients suffering from G.P.I. with paroxysms; they regarded the paroxysms as due to mechanical and toxic effects of the sudden increase of spirochætes. During my researches I have noticed that the spirochætes are situated chiefly in the lower strata of the cortex, sometimes in such quantity as to show almost a pure culture. This was noticed not only in cases of G.P.I. with paroxysms, but also in those without. In eight cases of G.P.I. the main colonies were in the boundary of the cortex and the medullary substance, and in the lowest strata of the cortex; this was so, not only when the spirochætes were localised, but when diffused over the whole area of the cortex. It is difficult to say without further research whether the spirochætes are permanently localised in these strata, because their dissemination is prevented by some means, or because the circulatory or microchemical environment is favourable. Some observations convinced me of the pathological and clinical importance of the boundary of the cortex and the medullary substance. In certain cases of disseminated sclerosis the sclerotic spots are mostly on this boundary. I found, as did Siemerling, in an acute and in a chronic case that the disintegration of the medullary sheath was situated underneath the cortex and in the lower boundary of the cortex. In cases of diffuse sclerosis and peraxial sclerosis (Rossolimo, Angyan,

FIG. 1.—Heterotopia in disseminated sclerosis.

Schilder) the spots of disintegration of the medullary sheath were immediately underneath the cortex, also overspreading some areas of the cortex; disintegration of the medullary sheath in the cases of G.P.I. (which were similar to those in disseminated sclerosis) was also to be seen on the boundary of the cortex and medulla, as was shown by Siemerling, Spielmeyer, Borda, and Fischer. These observations show that there are certain places in the central nervous system which have microchemical properties of importance in the ætiology of G.P.I.; in regard to the parasitological aspect the lower strata of the cortex seems to have microchemical affinity with the spirochætes.

The spirochætes appear in largest quantity in this place, and the so-called degenerative forms are mostly in the upper strata of the cortex. In an interesting case of disseminated sclerosis I found fine spirochætes diffusely spread in the upper strata of the cortex. (Figs. 1 and 2.) This diagnosis

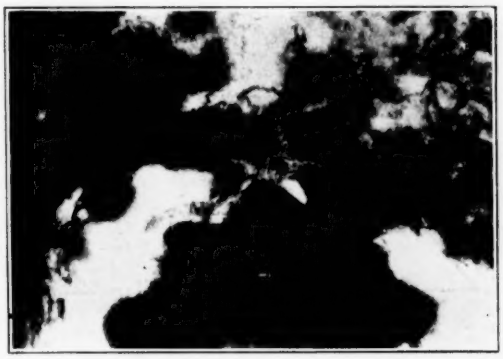


FIG. 2.—Spirochætes in the cortex of a case of disseminated sclerosis.

shows an affinity between disseminated sclerosis and G.P.I. in regard to ætiology; the gold sol reaction of the cerebro-spinal fluid is similar in disseminated sclerosis, in G.P.I., and in cerebral syphilis; it is probable that the spirochætes found by Kuhn and Steiner are a similar kind to the *S. pallida*. It was impossible to show spirochætes in the brain of patients suffering from G.P.I. in those cases when 10 per cent. formalin was injected into the brain through the carotids two hours after death. I thought I should be able in this way to fix the spirochætes thoroughly and instantaneously around the veins, but either the formalin stream carried off the spirochætes or they did not happen to be present in that part of the tissue examined. If, indeed, the formalin stream carries off the spirochætes this would be a favourable fact from the therapeutic point of view. We cannot yet judge the results of the carotid injections made by Knauer. It is

obvious, however, that one could always discover even dispersed organisms if the central nervous system had not previously been hardened by injection.

Summary.

1. Large quantities of spirochætes are to be found in the central nervous system in cases of G.P.I., even when it runs a simple course without paroxysm. 2. The main colonies of the spirochætes settle in the lowest strata of the cortex, and while increasing in number there they may spread over other areas of the cortex; whilst alterations of the tissue of the cortex may be extensive the alterations of the medullary sheath are most obvious just on the edge of the cortex and medullary sheath. 3. I was able to show fine spirochætes in the lower layers of the cortex in a case of disseminated sclerosis; there seems to be some connexion between disseminated sclerosis and alterations of medullary sheath, because in both cases the result caused by spirochætes is plexiform disintegration of the medullary sheath, of which the site of election is the boundary of the corticular and medullary substance. 4. Formalin injection prevents demonstration of spirochætes in the central nervous system.

I take the opportunity to express my thanks to my chief, Professor Moravcsik, for his kind suggestions and advice.

OBSERVATIONS ON THE USE OF CITRATED MEDIA.

BY H. C. BROWN, C.I.E., M.B., B.CH. CAMB.,
MAJOR, I.M.S.
(From the Wellcome Bureau of Scientific Research.)

CITRATE of soda has for many years been used when collecting samples of blood for cultural tests; the admixture of the blood of an animal with a solution of sodium citrate is also employed in the preparation of blood media. It is naturally important to be certain that the addition of sodium citrate has no restraining influence on the bacteria to be cultivated. Harvey[1] states that the addition of sodium citrate to a nutrient broth tends to inhibit the growth of *B. typhosus*. In a special report[2] of the Medical Research Council it is stated that, as the addition of citrate of soda to human blood tends to prevent the growth of many bacteria, this procedure should not be employed. Rosenthal[3] has used citrate of soda instead of bile when studying the cultural characteristics of the enterococcus.

Addition of Citrate Apparently Favourable to Bacterial Growth.

Whilst working with this organism in a lemco-peptone broth to which 1 per cent. of sodium citrate had been added, I was struck with the great increase in growth that the addition of citrate of soda to a medium had so altered the reaction of the medium as to make it more favourable to the growth of certain organisms.

Method of Investigation.

In order to investigate whether this surmise was correct, a batch of broth was taken and divided into two parts, one being kept as the control, the other portions of the remainder being citrated by the addition of 1, 2, 3, 4, and 5 per cent. citrate of soda. The samples were tubed in 10 c.cm. quantities. The P_h of the original broth was found to be 7·3, and that of each of the citrated samples 7·4; after autoclaving for 20 minutes at 115° C. the P_h of the uncitrated was 7·4, and each of the samples of citrated broth was also 7·4. Tubes, each containing 10 c.cm., having been sown with one loopful of a 48 hours' culture of cholera, were incubated at 37° C., and although the initial reaction of the medium was the same in each case, the growth in the citrated tubes was considerably heavier than in the control broth. In each case smear preparations were made from the cultures and stained by Gram's method in order to exclude the possibility of any error due to contamination. (See Charts 1 to 3.)

Determination of Change in Citrate of Soda.

The next point to be determined is whether any change has taken place in the citrate of soda by the growth of such organisms as cholera and *B. cloacæ*. This is best elucidated by the application of the following simple chemical test. If a 10 c.cm. sample of 1 per cent. citrated broth is taken and an equal volume of a saturated aqueous solution of lead acetate is added, a flocculent white precipitate is produced, which gradually settles; after 48 hours the precipitate occupies a height of approximately one-quarter of the total height of the fluid in the tube, whereas in the case of a 48 hours' culture of cholera, in the same medium, the precipitate only occupies a height of approximately one-eighteenth of the total height of fluid. Presumably what has happened is that the sodium citrate, in the case of the V. cholera culture, has broken up, and consequently only a partial precipitation takes place on the addition of the lead acetate. This effect may be shown rapidly by centrifuging the tubes.

When an organism such as *B. coli communis* is grown in 1 per cent. citrated broth for 48 hours and is treated in this way, the precipitate is as abundant as in the tube containing sterile citrated broth. This is well shown in Fig. B, and when this is compared with Fig. A we see that a heavy precipitate on the addition of lead acetate is produced in the case of those organisms of which the growth is inhibited by the addition of citrate of soda. The addition of lead acetate to a citrated broth culture of an organism provides further evidence

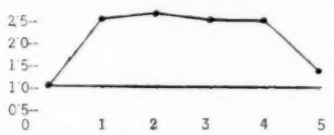


CHART 1.—Cholera, 24 hours. Increase of growth in citrated broth.

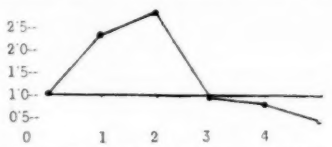


CHART 2.—*B. cloacæ*, 24 hours. Showing maximum growth in 2% citrated lemco broth, P_h 7·6.

CHART 3.—*B. typhosus*, 24 hours. Showing inhibition of growth.

NOTE.—The horizontal line in each chart shows the yield of organisms in the control uncitrated broth. The figures 0 to 5 under each chart indicate the percentage of sodium citrate.

compared with that in the uncitrated broth. The citrate used throughout these observations was the ordinary trisodium citrate having a faintly alkaline reaction.

Numerous other organisms have been studied in this way, and it was found that although citrated broth exerted a distinctly inhibitory action on the growth of the majority of organisms, certain other organisms produced a considerably heavier growth in citrated than in the control broth. A list of the organisms in which the growth is inhibited or enhanced in citrated broth is shown in the Appendix. It might naturally be assumed of the differential peculiarities of certain organisms when grown on citrated media.

Another point of interest with regard to citrated fluid media is that certain organisms are capable of producing gas when grown in this medium, without the addition of any carbohydrate, for 72 hours or more. So far I have only been able to demonstrate gas formation with *B. pneumoniæ*, Friedländer, *B. cloacæ*, and *B. paratyphosus C.*, and in the case of these organisms no gas was produced in the control broth which contained no citrate.

Growth in Solid Media.

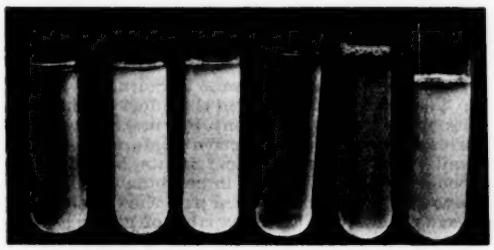
So far the effect of growing organisms in citrated fluid media has been considered, but when solid media

[1] Indian Journal of Medical Research, 1919, vol. vii., p. 360.
[2] Medical Research Council: Special Report Series No. 51, p. 31.
[3] C. R. Soc. Biol., 1917, vol. lxxx., p. 856.

are citrated in a similar manner the same holds good. If two samples of nutrient agar are taken, and one portion is citrated to 1 per cent., and then both samples are brought to the same P_h it will be found that if equal amounts of a broth culture are thoroughly spread over each agar slope the yield of cholera after 24 hours' incubation per square centimetre of solid medium is considerably greater in the case of the citrated than in the control medium.

When one comes to study the effect of growing cholera and other cholera vibrios on citrated media the

FIG. A.

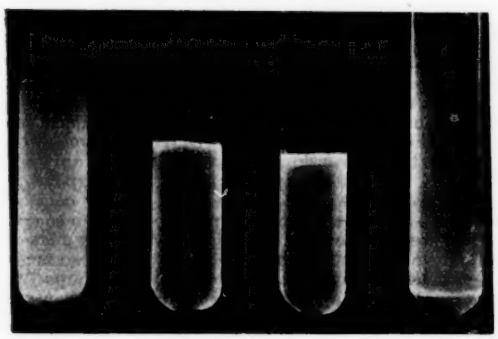


1 2 3 4 5 6

1. Enterococcus, ordinary broth. 2. Enterococcus, citrated broth. 3. Bacillus coli, ordinary broth. 4. Bacillus coli, citrated broth. 5. Cholera, ordinary broth. 6. Cholera, citrated broth.

difference between the growth of cholera and those of the vibrios of Metchnikoff and Finkler Prior is very striking, for the growth of the two latter is markedly inhibited by citrate, whereas that of cholera, as already mentioned, is greatly enhanced. Other organisms, however, such as the El Tor vibrio, and paracholera A and B (Mackie and Storer), also vibrios K, Belah, and Ferrest (Mackie) all show a greatly increased growth in

FIG. B.



7 8 9 10

7. Enterococcus, citrated broth. 8. Bacillus coli, citrated broth. 9. Control, citrated broth. 10. Cholera, citrated broth.

citrated broth, and cannot therefore be distinguished in this way from the true cholera vibrio. This fact is specially interesting in that these organisms are more closely allied to the true cholera vibrio than are the vibrios of Metchnikoff and Finkler Prior. In the case of the paratyphoid bacilli I have found that the growth of *B. paratyphosus A* is inhibited in citrated media, whereas that of three strains of *B. paratyphosus B* and also *B. paratyphosus C* is enhanced. The dissociation of the citrate in the case of *B. paratyphosus B* and *C* is clearly demonstrated on the addition of lead acetate, and forms a means of discriminating between *B. paratyphosus A* on the one hand and *B* and *C* on the other, for in the case of the two latter organisms the amount of the lead acetate is considerably less than in the case of *B. paratyphosus A*.

Gas formation in a citrated broth after 48 hours in the case of *B. paratyphosus C* appears clearly to differentiate this organism from *B. paratyphosus A* and *B*. Similarly, certain types of intestinal streptococci can be differentiated from others by their behaviour in citrated media, and I have found the test useful in the case of certain unclassified organisms isolated from rats.

The majority of these observations have been conducted with a 1 per cent. citrated broth, but it is probable that a broth citrated to 2 per cent. would have given still more striking results. As regards the length of time of incubation necessary to secure the best results, I am of opinion that 48 hours is probably the optimum, as I have noticed on more than one occasion that when the tubes are incubated for shorter intervals there is apparently, first of all, a slight retardation of the growth in the citrated broth before the enhancement occurs. The terminal hydrogen-ion concentration of citrated and uncitrated cultures may possibly throw further light on the matter, but so far I have not investigated this point. No apparent dissociation of citrate takes place when citrated media are subjected on more than one occasion to high pressure sterilisation; it is thus a medium easy to prepare.

Conclusions.

1. The effect of the addition of citrate of soda to media is that, whilst it inhibits the growth of some organisms, it produces an increase in the growth of other organisms.
2. This increase in growth is not caused by any alteration in the reaction of the medium due to the addition of citrate.
3. The dissociation of the sodium citrate by certain organisms can be well demonstrated by the addition of lead acetate to a 48 hours' culture.
4. Certain organisms are capable of producing gas in simple citrate fluid media.
5. Citrated medium forms an easy means of differentiating the true cholera vibrio from certain other vibrios, also *B. paratyphosus A* from *B. paratyphosus B* and *C*, and certain types of *Streptococcus fæcalis* from others.
6. The addition of citrate of soda to nutrient media should prove useful in the large scale production of cholera vaccine, provided that the antigenic power of the vaccine is not in any way affected.
7. Citrated media can be autoclaved on more than one occasion without affecting their cultural characteristics.

I am much indebted to the Curator of the National Collection of Type Cultures at the Lister Institute for his courtesy in supplying me with the majority of the cultures used in these preliminary observations, also to Captain S. R. Douglas and Dr. White Robertson for the strains of *Streptococcus fæcalis*.

Appendix.

Organisms showing an increased growth in citrated media.	Organisms showing inhibition of growth in citrated media.
V. choleræ.	*B. coli*, Escherich.
V. paracholeræ A, Mackie and Storer.	*B. typhosus.*
V. paracholeræ B, Mackie and Storer.	*B. paratyphosus A*, strain Schottmüller.
V. K., Mackie.	*V. Metchnikovi.*
V. Forrest, Mackie.	*V. Finkler Prior.*
V. Belah, Mackie.	*B. dysenteriæ*, Flexner.
V. El Tor.	*B. dysenteriæ*, Shiga.
B. lactis aerogenes.	*B. Morgan No. 1.*
B. pneumoniæ, Friedländer.	*Staphylococcus aureus.*
B. cloacæ.	*Staphylococcus albus.*
Enterococcus, Tissier.	*B. enteritidis*, Gärtner.
Enterococcus, De Freece.	*B. prodigiosus.*
Str. fæcalis, Stubbs.	*B. proteus.*
Str. fæcalis, A. E. W.	Meningococcus.
Str. fæcalis, Forrest 1.	Pneumococcus.
B. paratyphosus B. Type, Hirschfeld. Strain, *Para C.*	*Streptococcus pyogenes.* *B. subtilis.*
B. paratyphosus B. Type, Hirschfeld. Strain, XII. Hog Cholera.	*B. pestis.*
B. paratyphosus B. Type, Hirschfeld. Strain, East Africa.	*M. catarrhalis.* *M. melitensis.*
B. paratyphosus B. Type, Schottmüller. Strain, Schottmüller Bainbridge.	*M. paramelitensis.*

Note.—Since writing this paper I have found a reference to the work of Altobelli in the *Bulletin de l'Institut Pasteur*, 1915, Vol. XIII, p. 133, in which attention is drawn to the fact that certain organisms, more especially *B. paratyphosus B*, are capable of attacking malates, tartrates, and citrates. The original paper is not available, and in the above abstract no mention is made of the enhancement or inhibition of growth of certain organisms or of gas formation.

Medical Societies.

ROYAL SOCIETY OF MEDICINE.

WAR SECTION.

A MEETING of this section of the Royal Society of Medicine was held on Dec. 13th, 1920, with the President in the chair.

Lieutenant-Commander E. L. ATKINSON, D.S.O., R.N., read a paper on

Snow-blindness,

based on his experiences in the Antarctic, 1911–13, in the winter campaign in France in 1916 to 1917, and at the Northern Russian Front in 1919. He considered that from the nature of its causation two different sets of symptoms result. 1. Selective reflection of violet and ultra-violet rays from the sun at maximum altitude at midday. This is intensified by the excessive illumination, the light being 1¼, judged by actinometer time. The number of the rays striking the eye is increased owing to the countless ice-crystals forming a perfect distributing surface. He contrasted this effect, if the surface were a perfect reflecting surface when there would then be no change in the intensity of illumination with the change in altitude of the sun. Fifteen minutes of such a day will cause snow-blindness, the symptoms being photophobia, lacrymation, chemosis, with slight hyperæmia of the retina, and later small corneal ulcers. The symptoms come on rapidly, especially on entering a tent where a primus stove is burning. Recovery is the rule. 2. The second class is complicated by diplopia, probably due to excessive strain on the internal and external ocular muscles. With ice-crystals falling the light is so diffused that it comes from every point. There is thus no contrast, and the strain on the visual apparatus is continuous and exceptional. The light value by actinometer time in these days varies from 2 to 12. Photophobia, lacrymation, and chemosis are less and there is no retinal change, and the symptoms do not usually develop for 24 to 48 hours. Hemisine 1 in 1000 is painless and the most efficient remedy. Prevention is assured by efficient glasses, which will give good contrast and cut out the violet end of the spectrum. Both theory and experience indicate that red and dark amber glasses are the best. That altitude of the sun was a very important factor was shown whilst crossing the Beardmore glacier in the Antarctic summer when the sun was always above the horizon. When travelling by night no snow-blindness occurred, while when travelling by day nearly everyone became affected.

Discussion.

Mr. G. E. GASK said that his only experience of snow-blindness was amongst the Swiss Alps, where it occasionally proved a great inconvenience to mountain climbers. The symptoms were conjunctivitis, chemosis, and swelling of lids. There was no retinal blindness. Twenty years ago black glasses alone were used, but these were found to shut out too much light, so as to render crossing glaciers or difficult climbing impracticable. Now deep green or amber glasses were used. If glasses were not available a certain limited protection was afforded by darking the lids and face with burnt cork. Snow-blindness might occur during a snow-storm with complete absence of direct sunlight.

Mr. A. W. ORMOND did not consider that snow-blindness was entirely due to ultra-violet rays, as the cornea and lens stop all such rays from getting through to the retina. The results appear to be secondary to the effect on conjunctiva and cornea. Snow-blindness was probably commonest as the result of exposure in a haze. He suggested that Sir William Crookes's glasses were the most satisfactory.

Mr. J. H. FISHER considered that the superficial conditions of conjunctivitis and keratitis were undoubtedly produced by actinic rays, and that Crookes's No. 2 glasses would probably be more satisfactory than No. 1. A missionary amongst the Canadian Esquimaux had informed him that these people suffered greatly from snow-blindness, and asked his advice as to preventive measures. He had recommended rose-tinted glasses, which the Esquimaux should fit into leather goggles so as to exclude lateral light.

Colonel R. H. ELLIOT considered that the scotomata were due to light rays, and that it was most important to cut off lateral light.

SECTION OF ELECTRO-THERAPEUTICS.

AT a meeting of this Section of the Royal Society of Medicine on Dec. 17th, Mr. S. GILBERT SCOTT, the President, in the chair, Dr. REGINALD MORTON related his impressions gained during a recent visit to the Frauenklinik at Erlangen in connexion with a

System of X Ray Treatment of Uterine Carcinoma

evolved there under Professors L. Seitz and H. Wintz. Some years ago Dr. Wintz, in the effort to improve the results of surgical treatment for uterine carcinoma, experimented with radio-active materials, especially radium. This being too local in its action, he then proceeded to use the X rays in combination, with some improvement. The next step was the development of apparatus and X ray tubes capable of giving a more or less continuous output of rays of a penetration and intensity such as had never before been available for practical work. A specially designed coil working continuously at a normal sparking distance of 16 inches is used to excite the tubes. The latter are of the usual "gas" type, also specially constructed to work at this resistance of 16 inches of air. A very ingenious automatic regenerator keeps the vacuum constant within very narrow limits, and the anticathode is worked at the constant temperature of boiling water. A zinc filter is used having an absorption equivalent to 12 mm. of aluminium. Every tube is standardised and frequently re-calibrated so as to conform to one of the basic principles of the system—the use of a radiation as nearly constant as is humanly possible. Working under the standard conditions the unit skin dose—the amount normal skin will stand just short of injury—will be given in approximately 35 minutes, at the normal focal-skin distance of 23 c.cm. There will be reddening of the exposed patch in from 4 to 8 days and tanning in from 3 to 4 weeks, but no destruction of normal tissue. Taking this unit skin dose as 100, it has been found that a cancerous growth requires 110 per cent. of this to ensure its destruction. Sarcoma requires only 80 per cent. and tuberculous glands and joints respond very favourably to a 50 per cent. dose. A 90 per cent. dose applied to a cancerous growth paralyses it, so to speak, and causes it to shrink, but it is not certainly destroyed and may recur; but if only a 40 per cent. dose is given it acts as a strong stimulant, with perhaps rapid increase in size and possibly serious or even fatal results. This brings us to another of the fundamental principles of the system, that the full cancer dose must be given on the one day. Another important principle is that every case and every dose has to be considered individually—accurately calculated and accurately administered, necessitating full anatomical and topographical knowledge. In a case of uterine carcinoma, for instance, it is found that when the unit skin dose is given over the symphysis, as above described, only about 18 per cent. of this reaches the cervix, dispersion and absorption accounting for the loss of approximately 82 per cent. Consequently further doses are necessary, using six ports of entry for thin subjects and a seventh directed against the vulva for those with thick abdominal walls. Six weeks later one parametrium is attacked, the other being done after 14 weeks. Superficial carcinomata are treated with the tube placed from 70 cm. to 100 cm. from the surface, the exposure varying from 5 to 10 or 11 hours. This is necessary to get even irradiation, since we have but one port of entry under such circumstances; the application is to be repeated after six weeks. The supra-clavicular and axillary regions receive special exposures at the first sitting. Usually the patients are not disturbed during these long sittings and are encouraged to sleep. If there is any restlessness a dose of omnopon or other sedative is useful.

With regard to results, of 24 cases of uterine carcinoma treated by the X rays alone during the year 1918, 20 at the present moment are quite well and leading normal lives, being at least clinically cured and free from any sign of carcinoma, local or general. Approximately equal success has attended the treatment of mammary carcinoma. If there is a large mass of cancerous tissue it should be removed by operation first, but if small it may be attacked at once with very good prospects of success. 75 per cent. of the cases of mammary carcinoma treated in the year 1917 by the X rays and without preliminary operation are now clinically cured.

Dr. LOUISA MARTINDALE (Brighton) read a paper on the Treatment of Uterine Fibroids by means of powerful deep irradiation through suitable screens on the Fribourg method, a procedure that has been before the profession for several years, and one that gives good results.

Dr. H. G. ADAMSON (London) spoke of the use of the X rays in dermatology, making special reference to the treatment of ringworm and pruritus. He also laid stress on the necessity for accuracy in dosage, advocating the method of measurement elaborated by Sabouraud and Noire as being the most reliable for the treatment of skin diseases at least.

The PRESIDENT, Dr. EARDLEY HOLLAND (London), Dr. J. R. RIDDELL (Glasgow), and Dr. R. W. A. SALMOND (London) also took part in the discussion.

SOCIETY OF MEDICAL OFFICERS OF HEALTH.

AN ordinary meeting of this society was held on Dec. 17th, 1920, at 1, Upper Montague-street, W.C., Dr. F. E. FREMANTLE, M.P., the President, being in the chair, when Professor H. R. KENWOOD delivered a presidential address on

The Work of the Navy, Army, and R.A.F. Group within the Society.

He pointed out that the health services of the fighting forces and of the civil community learnt much from each other during the war; more particularly was the civilian community the richer by the experience, and one object of the Group should be to assist in the utilisation of this knowledge.

The Great War, he continued, witnessed an unprecedentedly full application of the ancient axiom that "prevention is better than cure." There was no axiom more generally accepted and more seldom practised by the individual; and so, foremost in our programme must be the endeavour to secure the goodwill and intelligent coöperation of the rank and file—be they fighters or workers—in the prevention of disease. It is impossible to overstate the value of judicious educational health propaganda work. The time for this is propitious; for the Great War trained and disciplined the populace through their war service and experiences, and it must have uplifted them to a higher level of common aim. Given satisfactory feeding and clothing *homo sapiens* need suffer but little from environment where there is knowledge of, and concern for, the simple rules of healthy living. The environment of the soldier, bad as it often was in trenches and billets during the war, was responsible for little sickness (thanks to good feeding and clothing, sanitary supervision, and discipline), save that due to vermin. General Beveridge had told them that some 50 per cent. of the total sick admissions resulted from disease caused by lack of personal cleanliness and the presence of vermin. There could be no doubt that much more could be done by a well-organised coöperation with the civil authorities to keep our fighting forces freer from vermin, and so to supplement and aid the Service provisions to this end.

Professor Kenwood then dealt with the case which the Great War established for the better spacing of troops in tents, huts, billets, and barracks. He pointed out that the greatest hygienic step ever undertaken in connexion with the army and navy, as proved by sickness and mortality returns, was the provision of additional cubic space and improved ventilation in barracks, and this was introduced many years ago. If the conditions here could be further improved (and there is room for this) it would immensely diminish sickness and promote physical fitness. Increased spacing, he said, meant money; better ventilation meant some difficult education and training of the men; but there would be a big balance on the credit side of the account—even in terms of £ *s. d.* He next referred to certain diseases, notably influenza, which need organised research on a comprehensive scale in order to study their behaviour in the mass. With reference to the course of epidemics, he was satisfied that the lack of susceptible population was not the main cause of their cessation.

In the Great War, he said, preventive inoculations were practised to an unprecedented degree, and death in many forms was thereby prevented to a proportionate extent. Is our civil community to benefit more fully from this experience? He next discussed some respects in which coöperation should be developed between the civil public health staffs and the service sanitary staffs, and the advantages and economy that would thereby result. In connexion with the Territorial Forces this coöperation should be developed to its maximum extent, by making the fullest use of the local knowledge and experience and of existing civil services and provisions, always with due regard to the needs of training and the circumstances of war. The necessity for devising fuller measures for the mutual protection of the civil and military population against the spread of venereal disease was impressed during the war, and here was an enormous wastage in the fighting efficients which could and must be reduced in the future. We learnt from the army to meet many sanitary requirements by means of simple and inexpensive appliances, fever hospitals, &c. Is the civil community going to profit from this lesson. The extravagant cost of many civil provisions has had the effect of limiting their adoption by smaller communities where they are often greatly needed. Cannot a happy mean be established between the two extremes?

Professor Kenwood concluded by expressing the hope that occasionally the Group would be invited by the Directors of the various Medical Services to coöperate in some matter of research in which they might be judged capable of rendering useful assistance. Such help would always be done in a spirit of loyal comradeship and with the sole object of rendering assistance to those who are in the responsible position of advising upon and directing the health provisions of the Services.

Discussion.

Professor JOHN ROBERTSON, M.O.H. Birmingham, drew attention to the great difference between conditions in peace and war time, and to the way in which the best laid plans in time of peace often go to pieces in war. Medical officers in Territorial units would need the direction of officers familiar with war conditions. In regard to the sanitary conduct of troops it was wise to expect nothing from the men but what they were actually compelled to do. He had been appalled at the lack of cleanly habits in the men. To encourage good ventilation they must be provided with blankets and proper means of warming. It ought to be possible to prevent vermin infestation in all conditions, and there should be a regular weekly issue of clean clothing. He mentioned the importance of proper spacing of individuals in schools and hutments, and said that he thought that an 8 ft. distance between man and man in tents would have almost prevented the spread of cerebro-spinal fever. Young officers, he added, must be taught to keep to proper sanitary standards, and the reasons should be explained to them. The available information as to sanitary matters in the war ought to be recorded and collated for future use.

Professor R. St. G. S. BOND, Naval Medical College, Greenwich, said that no one appreciated the Presidential Address more than the naval members. The problem of air-space, ventilation, and spacing was of great importance on warships, and was accentuated by the crowding of extra men on board in the war. Diseases of respiration were prevalent, and influenza was very bad on ships during the outbreak. Before the war the medical officer on a ship had to act as medical officer of health, even if he lacked proper training. During the war a naval sanitary service was founded. Naval health officers had since been appointed at some of the principal ports, and it was hoped that the service would be further extended. Money was the difficulty.

Major-General Sir W. MACPHERSON said that the Group constituted a liaison between medical officers of health

and the medical officers of the Services. At the early stages of the war local medical officers of health gave great assistance in connexion with billets. One of the greatest achievements of the war was the work of the sanitary sections in France. The French were astonished at the perfection of our latrine arrangements in the front line, and later imitated them. General Macpherson emphasised the importance of education in sanitary matters and mentioned that in some details, such as the disposal of refuse and excreta, the civil authorities could learn from the military.

Dr. G. A. AUDEN, school medical officer, Birmingham, said that the importance of sanitation must be inculcated in the combatant officers. He was surprised at the way in which even public school men relapsed into hopelessly insanitary habits on active service.

Squadron Leader A. GRANT, R.A.F., mentioned the importance of coöperation between civil and service medical officers, and referred to a recent outbreak of cerebro-spinal fever, which was only recognised after an R.A.F. man had become involved in it. Infectious conditions were often introduced into units by men who acquired them when on leave. Difficulties arose from the absence of facilities for the prophylactic treatment of venereal diseases for men on leave.

Professor P. S. LELEAN, R.A.M. College, in connexion with the question of spacing, stated that Petri dishes placed in the proximity of men whose throats had been sprayed with *B. prodigiosus*, showed numerous small colonies at distances of 2 and 4 feet, fewer at 6 feet, and at 8 feet they were beyond the reach of infection by fine spray and only received occasional massive infection from droplets. He paid a tribute to the work of officers of sanitary sections, including architects and surveyors with medical men. He remarked on the badness of the water-supply in some rural districts.

Dr. HERBERT JONES, M.O.H., Herefordshire combined districts, referred to the initiation of the sanitary service, which was intended by Sir Alfred Keogh to enlist the services of the principal civilian medical officers of health.—Dr. W. J. SLOAN, Assistant School M.O., L.C.C., spoke of the exactness with which the carrier rate in cerebro-spinal fever corresponded with the spacing of the men.—Dr. HUTCHINSON WOOD, M.O.H., Biggleswade U.D.C., said that the sanitary education of the commanding officer was necessary, as well as of the rank and file.—Dr. R. H. WILSHAW, M.O.H., Worthing, suggested that the sanitation of camp hutments could be very much improved by following the lines of sanatorium buildings.—Dr. C. SANDERS, M.O.H., West Ham, inquired whether the meeting could not do something to hasten the production of the sanitary history of the war. It was ten years before that of the American War was published.

The PRESIDENT said that the war had required adaptation on the spot to all sorts of conditions previously unknown, such as strange climates and new infections. He instanced the way in which malaria had been dealt with by medical officers who had never before come across it. There had been remarkable opportunities for preventive work owing to the possibilities of complete control over the activities of the men, and of obtaining comprehensive statistics and returns. The generation which had fought and the next generation would yet benefit from the habits of hygiene inculcated during the war. He predicted a brilliant future for the new Group.

Professor KENWOOD, in replying, indicated the following items of work for the Group in the immediate future: (1) education and health propaganda; (2) coöperative measures for safeguarding the mutual interests of the civil and military medical officers; (3) advising the civil authorities as to the adaptation of military sanitary measures to civil conditions; (4) camp hygiene and sanitation (sites, water-supply, hutment types, &c.). He said that the honorary secretary of the Group (Dr. W. N. W. Kennedy, Town Hall, Croydon) would be pleased to receive the names of any naval, military, or R.A.F. medical officers desirous of joining the Group.

Thirty-one new members of the society were elected at the meeting.

ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE.

Exhibition of Cases and Specimens.

A WELL-ATTENDED meeting of this society took place on Dec. 17th, 1920, at the laboratories of the London School of Tropical Medicine, 23, Endsleigh-gardens, N.W., with Professor W. J. R. SIMPSON, the President, in the chair.

The following demonstrations were given:—

Sir JAMES CANTLIE showed a male patient from Baghdad suffering from "Baghdad Ulcer" on the finger of several months' duration.

Dr. H. S. STANNUS: Sections and photographs of examples of malignant disease in African natives. (1) Spindle-celled sarcoma of the testicle with secondary deposits in each orbit; (2) carcinoma of the thyroid and liver; (3) malignant parotid tumour. He referred to the comparative infrequency of malignant disease among natives, which, as the result of 15 years' experience in Central Africa, he thought was not as rare as generally supposed.

Colonel S. P. JAMES, I.M.S.: Specimens illustrating true indigenous malaria in England. Stained blood-films, showing *Plasmodium vivax* from cases of benign tertian fever in children aged 5 and 13, in October, 1919, and August, 1920, coming from Queenborough and Isle of Grain, Kent, and *Plasmodium falciparum* from a case of malignant subtertian fever in a girl of 18 at Sheerness; slide preparation of stomach of *Anopheles maculipennis* fed on a case of indigenous malaria and showing many zygotes. A map of England was shown giving the geographical distribution of cases of malaria in 1915–17, and in 1919.

Surgeon Rear-Admiral P. W. BASSETT-SMITH: Trypanosome Infection of Fœtus—specimens of *T. gambiense* in the spleen and liver of the guinea-pig fœtus and of *T. rhodesiense* in the liver of the rat as the result of maternal infection. Transmission of trypanosome infection to the healthy young guinea-pig by suckling from the infected female had been reported, but his experiments in this direction had proved negative.

Dr. A. C. STEVENSON: Extravascular Distribution of Trypanosomes in Tissues—sections (1) of the choroid-plexus, kidney, and stomach of a guinea-pig, showing presence of *T. nigeriense* in the areolar tissues; (2) of the labyrinth of the ear, heart muscle, and mediastinal lymph gland showing *T. rhodesiense* infection of the areolar tissues.

Major H. C. BROWN, I.M.S.: (1) Standardisation of Bacterial Suspensions by Opacity for estimation of weight and number of organisms in vaccines, aided by calculated proportional tables of the required vaccinal strengths; (2) the value of citration of liquid culture-media by sodium citrate (1 per cent.) for the purpose of retarding or augmenting bacterial growth—e.g., in particular the inhibition of *Paratyphosus A*, and increasing the development of *Paratyphosus B* and *C*.

Dr. ANDREW BALFOUR: Models of Fruits and Food-stuffs from India.

Dr. P. MANSON-BAHR: 1. Amœbic Dysentery. Illustration of the value of sigmoidoscopic examination in diagnosis, by drawings of the appearance of the ulcerated rectal wall and of scrapings obtained through the sigmoidoscope showing *E. histolytica* cysts in large numbers. 2. Kala-azar. (*a*) Persistence of *Leishmania donovani* in the bone marrow in a patient who died from intestinal complications. (*b*) Section of liver showing periportal cirrhosis and perihepatitis, associated with ascites and perisplenitis. 3. Malignant subtertian malaria in a Palestine case. Blood films showing multiple ring forms of the parasite. Sections of liver and heart muscle exhibiting many parasites in the blood-vessels. 4. Stomach of infected *A. maculipennis*, showing presence of sporozoites.

Lieutenant-Colonel A. ALCOCK: Specimens of—(1) the tick *Dermacentor venustus*, vector of Rocky Mountain fever; (2) British anopheline species, *A. bifurcatus* and larvæ, *A. maculipennis*, *A. plumbeus*; (3) *Stegomyia fasciata*, living and microscopical specimens of larvæ;

(4) fruit mite (*Carpoglyphus passularum*) from case of grocer's itch; (5) flea (*Pulex irritans*), showing the anatomy of the alimentary tract—in particular the mouth apparatus and proventriculus.

Dr. J. G. THOMSON: Preparations of Leishmania Infections. (1) Kala-azar. *Leishmania donovani* in smear from spleen pulp and section of spleen; living and stained specimens of the parasite obtained by N.N.N. (Novy-MacNeal-Nicolle) method of culture. (2) Oriental sore. *Leishmania tropica* in section of the granuloma and in living and stained preparation from culture by N.N.N. method.

Professor R. T. LEIPER: Helminthological Preparations. (1) *Dipylidium caninum* from a female patient in South Africa; (2) shells of *Bithynia striatula*, intermediary mollusc host of *Clonorchis sinensis* (human liver fluke); (3) cercaria of *Clonorchis sinensis* on a fish scale; (4) abnormal branching of *Hymenolepis*; (5) cystercercoids expelled from body cavity of *Cypris* and *Cyclops*; (6) ova of:—*Clonorchis sinensis*; *Fasciolopsis buskii* and *Heterophyes heterophyes* (intestinal flukes); *Schistosoma japonicum*; *Paragonimus westermanni* (lung fluke); *Oxyuris vermicularis* showing the inner shell; *Ascaris lumbricoides*; *Ankylostoma duodenale* (from a cat experimentally infected).

Dr. G. C. LOW: Human Blood Filariæ. Fresh blood-film preparation showing the living embryo of *F. bancrofti* (*nocturna*); stained preparations differentiating embryos of *F. bancrofti* and *loa* (*diurna*).

Dr. E. ATKIN and Mr. A. BACOT: Rickettsia of Typhus and Trench Fever. (1) Typhus. Specimens of *Pediculus corporis* and *capitis* fed on human case of typhus, showing *R. prowazeki* in coccoid and bacillary forms, also in smears of gut contents, and in smears of *P. capitis* fed on typhus-infected monkey; sections of brain of guinea-pig infected with typhus show cell proliferation about the blood-vessels. (2) Trench fever. Smears of secretion and section of gut of *P. corporis* showing *Rickettsia quintana*. (3) Rickettsia bodies in gut smear of the tick *Dermacentor venustus* vector of Rocky Mountain fever. (4) *R. lectularia* of bed-bug. (5) *R. melophagi* in smears of ovary and kidney of sheep.

Lieutenant-Colonel G. E. F. STAMMERS, R.A.M.C.: Spirochætal Jaundice in the Guinea-pig. Cadaver of infected guinea-pig showing pleural and peritoneal hæmorrhages. Sections of lung of guinea-pig, infected from the rat, and of the liver of rat, both showing the presence of *Leptospira*.

Colonel CLAYTON LANE, I.M.S.: Demonstration of Levitation Method for Concentration of Ankylostome Eggs in Fæces.

Sir STEWART STOCKMAN: Piroplasmosis of Domestic Animals.

Mr. J. T. EDWARDS: Pathological Specimens of veterinary interest. Inflammation of ileum of ox in Johne's disease; enlargement of spleen due to Hodgkin's disease in a dog; aorta of horse showing verminous penetration by *Strongylus vulgaris*; lung of ox showing consolidation in hæmorrhagic septicæmia; ulcerative colitis due to infection by *B. necrophorus* in swine fever; swine erysipelas shown by typical skin lesions and chronic vegetative endocarditis; diphtheria of tongue and lips due to infection by *B. necrophorus* in a calf; tongue of calf in foot-and-mouth disease, &c.

Dr. A. CASTELLANI: Some Tropical Mycoses. (1) Bronchomycosis due to *Monilia krusei*, shown in films from sputum and in culture; (2) *Tinea imbricata* of skin due to *Endodermophyton indicum*; (3) acladiosis—ulcers of leg—caused by *Acladium castellani-pinoyi* ((2) and (3) shown in photographs and cultures); (4) mycelial fungus in urine from a case of cystitis.

LIVERPOOL MEDICAL INSTITUTION.

A MEETING of the Pathological Section was held on Dec. 2nd, with Dr. J. E. GEMMELL, the President, in the chair, when Professor G. J. ADAMI read a paper on

The Pathology of Influenza.

He described the attempt to find a common lesion for the successive stages of pre-pandemic purulent bronchitis, pandemic pneumonia, and the hæmorrhagic pulmonary œdema characteristic of the late pandemic of influenza, and to distinguish those lesions due to the primary causative agent from those due to the secondary invaders. He said it was the generally accepted view that the influenza epidemic started in May of 1918 and was followed by a much more serious epidemic in the autumn, but he did not think this view correct. As early as 1916 and the spring of 1917, Hammond, Rolland, and Shaw described in THE LANCET [1] a series of cases of purulent bronchitis in the Etaples area, characterised by a peribronchitis, a destruction of the lining epithelium, a bronchitic and bronchiolitic purulent discharge and all associated with the presence of both the influenza organism and the pneumococcus. In the latter year, 1917, an exactly similar epidemic was noted in the Aldershot area by Dr. Adolphe Abrahams and others.[2] In the same year the American bacteriologists noted a very fatal form of pneumonia following measles. MacCallum showed that the morbid anatomy of the respiratory tract was that of an interstitial pneumonia, an exudate that was not excessively cellular, a destruction of the epithelium of the bronchi, and a microscopic appearance of the bronchioles extremely suggestive of the French and English epidemics. MacCallum found, however, that the chief organisms in this series were a hæmolytic streptococcus and the pneumococcus. The influenza organism was only noted a few times. Then came the great epidemics of 1918. Dr. Adami showed that in the reports from France, Macedonia, Italy, India, and America he was able to trace a common histology and bacteriology. From all areas the disease was ushered in with congestion and suppuration of the upper nasal respiratory tract, and in those reports where these parts had been bacteriologically examined invariably the influenza organism had been recovered. Farther, a tracheitis limited to the lower third of the trachea was, perhaps, the greatest common histological factor. He felt sure that whatever may have been the changes due to other organisms, the influenza organism of Pfeiffer, if not the causa causans, was always associated with the disease. In the autumn, however, it was obvious that the virulence of the organism had been raised to an inordinate degree, and he suggested that the absence of pus and the hæmorrhagic œdema and the marked lymphatic dilatation might be explained by negative chemiotaxis. In this connexion Dr. Adami referred to the classical experiments of Metchnikoff on mild and virulent anthrax organisms. Dr. Adami then demonstrated the means whereby the lungs are protected from organisms by the obliquity of the naso-pharynx and the ciliated epithelium, and showed how in influenza this beautiful protective device breaks down.

The discussion was adjourned until the next pathological meeting.

A clinical meeting was held on the afternoon of Dec. 16th, 1920, Dr. J. E. GEMMELL, the President, in the chair.

Dr. FRANCES IVENS read a note on the

Use of Antigonococcal Serum,

indicating briefly the methods used and the results obtained in a series of 30 cases. The patients were, with two exceptions, young married women. Thirteen had no children and nine one only. The cases included 22 of tubal infection, three of endocervicitis, and two of arthritis occurring during pregnancy and the puerperium. Nicolle serum had been employed, and was administered in 19 cases subcutaneously, in six into the tubes and peritoneal cavity, and in five vaginal or local applications had been made. To avert anaphylactic shock normal saline solution had been administered simultaneously. All the cases made good immediate recovery and the after-results were strikingly good in the majority of the cases, the least successful being those where the intraperitoneal method had been employed. Dr. Ivens considered that the results warranted further experiments and study, and asked for suggestions respecting the best method of administration in view of the special characters of the organism and the fact that it did not belong to a diffusible group.

Clinical cases were shown by Dr. John Hay, Drs. R. J. M. Buchanan and J. C. Matthews, Dr. H. M. Mitchell, Dr. A. D. Fordyce, Dr. R. Stopford Taylor, Mr. T. Stevenson, Mr. F. J. S. Heaney, Mr. G. C. E. Simpson, Dr. R. W. MacKenna, Mr. T. H. Bickerton, Dr. Murray Bligh, and Mr. R. C. Dun.

[1] THE LANCET, July 14th, 1917. [2] THE LANCET, Sept. 8th, 1917.

Reviews and Notices of Books.

WOMEN AS ARMY SURGEONS.

Being the History of the Women's Hospital Corps in Paris, Wimereux, and Endell-street, September, 1914–October, 1919. By FLORA MURRAY, C.B.E., M.D. London: Hodder and Stoughton. 1920. Pp. 263. 12*s.* 6*d.*

THIS book, besides being a most interesting record of indubitably valuable work, is also a glorification of the women's movement, including the struggle for the suffrage. No medical woman or man can withhold praise from the way in which the Women's Hospital Corps did their work; often, especially in the early days of the war, as at Paris and Wimereux, in conditions of extraordinary difficulty. Lack of transport for the wounded was the curse which afflicted both the French and the British medical service in the early days, and had it not been for the American voluntary fleet of motor ambulances matters would have been even worse than they were. The rapidity with which the women organised their hospital corps and managed to get the hospital in Paris into working order is amazing. The idea was set on foot on August 12th, 1914; on Sept. 14th the W.H.C. left Victoria for Paris, and took up its abode in the Hotel Claridge, where by the evening of Sept. 17th they had 50 beds ready for patients.

Not long after this the unit expanded and opened a hospital at Wimereux, this time under the Royal Army Medical Corps; the Paris hospital was under the French Red Cross. On Jan. 18th, 1915, it was decided to close the hospital in Paris on account of various difficulties, mainly the almost insuperable one of getting enough fuel, and the staff proceeded to Wimereux to join up with the rest of the corps, but in about a month Sir Alfred Keogh offered the corps the charge of a large hospital in London. This was in February, 1915, and by May of that year the hospital in Endell-street, formerly the workhouse of St. Giles, Bloomsbury, was opened, the staff approximating to 180 persons, of whom 21 were men of the R.A.M.C. detachment. The hospital did admirable work, for an account of which we must refer the reader to Dr. Murray's book, where, besides accounts of the professional work carried out, there will be found amusing descriptions of the conflicts with "brass hats" and the War Office. However, the energy and enthusiasm of the staff triumphed over all difficulties, and Endell-street went ahead until October, 1919, when the order went forth that it should be evacuated and closed. Dr. Murray's pride in the W.H.C. shows in every line of her book, but it is pardonable. There is a trifling error on p. 142, where Hildegarde is mentioned as the "famous medicine woman of the third century"; she lived from 1098–1180.

TEXT-BOOK OF TRACHEO-BRONCHOSCOPY.

Technical and Practical. By Sanitätsrat Dr. M. MANN. Translated by A. R. MOODIE, M.A., M.D., Ch.B. St. And., F.R.C.S. Edin. London: John Bale, Sons, and Danielsson. 1920. Pp. 292. 31*s.* 6*d.*

THE first part of this treatise, after a short and perfunctory account of the anatomy, is devoted to the technique of the method of direct examination, and begins with a long illustrated list of instruments; though he expresses no opinions in this section, we gather that the author prefers Brünings' apparatus. There follow some useful hints on the introduction of the tube. Dr. Mann favours the sitting position and local anæsthesia, though he mentions that Killian's school has, from the first, considered general anæsthesia a necessary expedient. We cannot, however, agree with the advice implicit in the statement that "when carrying out upper bronchoscopy in an infant, it is sufficient simply to hold it still with the hand." The next section is the most valuable and comprises abstracts of a large number of cases of foreign bodies in the trachea and bronchi, of absorbing interest to the laryngologist; the list is naturally far from complete, and we regret to find so few British cases quoted, although plenty of good work in this field has been done here. The following section deals with bronchoscopy in diseases of the bronchial system. Dr. Mann is disappointed that, in the six years since his book appeared in Germany, there has been an almost complete disappearance of published papers by those who have endeavoured to employ the method in disease of the thorax, either for examination or therapeutic applications. He gives some interesting descriptions of the result of examination in various diseases, but, though he urges physicians to make use of bronchoscopy for purposes of treatment, the results he is able to give are not, so far, very encouraging. There are several good coloured plates of post-mortem specimens, but only one, though an interesting one, of a series of images seen through the bronchoscope. It could be wished that the author had included œsophagoscopy in his survey. Owing to a misapprehension of the original German, Clar's lamp is attributed to "Clarsche," but the translation into rather colloquial English is, on the whole, excellent.

ACCESSORY SINUSES OF THE NOSE.

The Catarrhal and Suppurative Diseases of the Accessory Sinuses of the Nose. By ROSS HALL SKILLERN, M.D., Professor of Laryngology, Post-Graduate School, University of Pennsylvania. London and Philadelphia: J. B. Lippincott Company. 1920. Pp. 418. 30*s.*

THE third edition of this work is practically a reprint of the second, reviewed in our columns early in 1917; it contains several new illustrations and one more page, devoted to a description of Grayson's method of exploratory opening of the sphenoidal sinus with a small hand-burr. The first section treats generally of anatomy, ætiology, symptoms, diagnosis, treatment, and complications; the next four sections deal respectively with the maxillary, frontal, ethmoidal, and sphenoidal sinuses, and there is a final short section on multiple sinusitis. The book is beautifully illustrated and gives a very thorough account of a difficult and complicated subject: it has already proved its value to the rhinologist. The price has been raised from 21*s.* to 30*s.*

LECTURES ON TROPICAL OPHTHALMOLOGY.

Delivered at the London School of Tropical Medicine, by ROBERT HENRY ELLIOT, M.D. Lond., F.R.C.S. Eng., &c. London: Henry Frowde and Hodder and Stoughton. 1920. With 13 illustrations. Pp. 36. 3*s.* 6*d.*

THIS brochure is the skeleton on which the larger work on "Tropical Ophthalmology," reviewed in THE LANCET, Nov. 6th, 1920, was founded. It is a useful introduction to the subject, such as might be expected from Mr. Elliot. In the section on the treatment of the eye complications of tropical diseases there is a warning to the tropical practitioner which, though contained in the larger work, is relatively more prominent in the smaller. It is that in the various conditions for which arsenical and antimonial preparations are used, it is essential that the doctor should "keep vividly before his mind's eye the spectre of optic atrophy."

FORMULAIRE DES MILIEUX DE CULTURE EN MICRO-BIOLOGIE.

By DERIBERE DESGARDES. Paris: Librairie le François. 1921. Pp. 98. Fr.4.

THIS small volume contains a collection of formulas for the preparation of the principal media used in bacteriological laboratories. An almost endless number of media have been described, and the author has perforce to limit his selection to those in general use. The media described are those most favoured in France; some which are favoured in this country are not mentioned—e.g., MacConkey's medium. There is no reference to Levinthal's medium for the cultivation of *B. influenzæ*. These defects are not of importance to the English reader, however. The book can be commended to those who require the information it offers.

ROENTGENOGRAPHICAL TECHNIQUE.

The Principles and Practice of Roentgenographical Technique. By I. SETH HIRSCH, M.D., Director, X Ray Departments, Bellevue, Fordham, Harlem, and Gouverneur Hospitals, New York City. London: H. K. Lewis and Co. 1920. Pp. 244. 60*s*.

Dr. Hirsch has had a long experience in teaching radiology, and few are more competent to write such a treatise as this. Knowing so well just what the student requires, he has carefully avoided that which does not matter, while giving plenty of what is necessary to make a successful radiologist. As the title suggests, fundamental principles are what count in the management of apparatus, assistants, and patients, and this idea runs through the whole work consistently. The technical details of many forms of apparatus are frequently a stumbling-block to the beginner, and in such cases the author has introduced a series of large-scale diagrams, serving admirably to clear up difficult points. The chapters on X ray tubes, as well as those on production and measurement of the X rays, and the practical applications of the principles, are particularly good. Fluoroscopy, radiography, postures and positions of the patient are described in detail and illustrated by blocks and diagrams of high quality and ample numbers. Numerous tables add to the value of the work, such as wiring tables, tables of absorption, voltages, exposure, and many others. The subject is a difficult one to undertake and Dr. Hirsch has done it well. There must be very few radiologists who cannot learn something worth knowing from a perusal of this volume; for the beginner it will be invaluable.

THE RADIOGRAPHY OF THE CHEST.

Vol. I., Pulmonary Tuberculosis. By WALKER OVEREND, M.A., M.D. Oxon., B.Sc. Lond. London: William Heinemann, Ltd. 1920. With 99 radiograms and 9 diagrams. Pp. 120. 17*s*. 6*d*.

THIS work is painstaking and well balanced. The author is enthusiastic as to the value of the X ray method in diagnosis, but is yet careful to maintain a sense of proportion between this and the more classical modes of examination, which, after all, have served very well.

This first volume commences with a chapter, illustrated with good radiograms as well as drawings, on the normal chest, and it is lucid and complete, but the author's views on the nature of the branching shadows that make up the pulmonary reticulum are open to comment. He still considers their origin obscure, whereas we were under the impression that the excellent work of K. Dunham had finally settled this question. In dealing with the various types of tuberculous involvement of the lungs the author gives first the usual history, symptoms, and clinical signs, follows on with the X ray appearances, and then contrasts or reconciles the whole as the circumstances permit. It is unnecessary to discuss these chapters in detail; the book must be read and studied in conjunction with the typical radiographs illustrating the various forms of pulmonary tuberculosis.

We think the value of the volume is marred by the adoption of an antiquated classification and nomenclature, as well as by the too free use of a phraseology which, while no doubt academically correct, the average medical man will find cumbersome. None the less Dr. Overend is to be congratulated on the extent and thoroughness of his work, which is a very valuable contribution to a difficult but interesting subject.

MANUEL D'URÉTROSCOPIE.

By ROBERT HENRY and ANDRÉ DEMONCHY. With a preface by Dr. MARION. Paris: Masson et Cie. 1920. With 86 illustrations, including 30 in colours. Pp. 116. Fr.25.

THIS little book gives a general survey of the subject of urethroscopy. A large part of it, more than half the text, is given to description of various urethroscopes and cysto-urethroscopes, and the accessory apparatus is commonly used in conjunction with these. An instrument designed by one of the authors, Demonchy's urethroscope, is described in detail, and in a chapter devoted to a critical examination of all the instruments mentioned it is given first place in order of merit. It resembles Luys's urethroscope in general construction but has a telescope attached. The authors pronounce those urethroscopes which are designed to give dilatation of the canal by air or water to be of little use, even in the examination of the posterior urethra, though they admit some virtues in the various irrigating cysto-urethroscopes. Most of their English readers will differ from them, for in this country aero-urethroscopes are generally used for the anterior urethra and irrigating instruments for the posterior. The latter part of the book contains chapters on the appearances of the normal and abnormal urethra, and on methods of treatment through the urethroscope.

All the illustrations in colour are of the appearances seen in the undilated urethra, which, of course, differ markedly from those obtained when the canal is dilated with air or water during examination.

EARLY EMBRYOLOGY OF THE CHICK.

By BRADLEY M. PATTEN, Assistant Professor of Histology and Embryology, School of Medicine, Western Reserve University. Philadelphia: P. Blakiston's Son and Co. Pp. 167.

THIS book was written to help the student in his early work in courses in vertebrate embryology. It is an admirable little work, interesting and instructive, and the student who brings a little intelligence to bear on his reading cannot fail to advance his knowledge, both of actual fact and of principle, to a considerable extent by its perusal. The descriptions are clear, the format excellent, and the illustrations good and useful. Altogether it is a book to be recommended.

ATLAS OF THE SENSORY CUTANEOUS NERVES.

By WILLIAM IBBOTSON, M.R.C.S., L.R.C.P. London: Scientific Press. 1920. Pp. 25. 7*s*. 6*d*.

THIS little book presents a series of coloured diagrams showing the areas of distribution of the sensory nerves. They are, of course, schematic, with appended explanatory notes. We notice that while the text gives the usual levels the situation of the lumbar enlargement in Fig. 1 does not correspond therewith. We also consider that the distribution of musculo-cutaneous on the palmar surface is perhaps too extensive in Fig. 6, and that the ulnar supply on the dorsum in Fig. 7 might be increased, while the area given over to the musculo-cutaneous of the leg in Fig. 8 is too extensive. The author, moreover, has larger views concerning the posterior primary area in the gluteal region than those generally taught. These, after all, are minor matters, in some way subjects of individual opinion, and hardly detract from the value and utility of this little work.

PSYCHOLOGY OF THE SPECIAL SENSES.

Their Disordered Functions. By ARTHUR F. HURST, M.A., M.D. Oxon., Physician and Neurologist to Guy's Hospital. London: Henry Frowde and Hodder and Stoughton. 1920. Pp. 123. 12*s*. 6*d*.

UNDER this title the Croonian lectures, which were delivered before the Royal College of Physicians of London in June, 1920, have now been published as a book. These lectures were reported in abbreviated form in THE LANCET, and were then the object of editorial comment. They record in permanent shape the valuable work carried out by the author in conjunction with colleagues both before and since the war at Guy's Hospital, and during the war in Lemnos, Salonica, Oxford, Netley, and the Seale Hayne Military Hospital. As a frontispiece to this volume *La Dame Stapart* is reproduced from Carré de Montgeron's "La Vérité des Miracles," depicting a miraculous recovery from hemiplegia, hemianæsthesia, and blindness, after a visit to a tomb in the Chapelle de Ste. Anne at Avernai in 1728.

AUTOBIOGRAPHY OF SIR CHARLES A. CAMERON.

With an Introduction by Sir JAMES H. M. CAMPBELL, P.C., Lord High Chancellor of Ireland. Dublin: Hodges, Figgis, and Co. 1920 Pp. 162. 7s. 6d.

IT is only reasonable to suppose that the reminiscences of a man in his ninetieth year, who is also a medical man, a public analyst, and also an Irishman, will afford interesting reading, and Sir Charles Cameron's book does not disappoint expectation. He was born in 1830 and one of his earliest recollections is talking to an old woman who in her youthful days had been present at, or rather had been but a mile or so away from, the field of Culloden during the battle. He also remarks that although he never saw anyone carried in a sedan chair, yet he knew of two which were to be seen on hire at the Rotunda. He presumes, therefore, that they had not quite ceased to be used at the end of the "thirties." Sedan chairs were in use much later than that date, for the late Sir Moses Montefiore attended a Royal garden party in one not very long before he died (1885), and between 1873 and 1877 an old lady who lived in Windsor always used to come to the Eton College concerts in a sedan chair. Sir Charles Cameron's book is full of delightful stories about all sorts of interesting people, among others Sir William Wilde, the aurist and oculist. Wilde was notorious for his untidy and dirty habits, and Sir Charles Cameron mentions the report that he was refused by Helen Faucit on the ground that he did not keep his hands clean. These same habits of Wilde were the occasion of Father Healy's happiest witticism. Healy was a friend of Cameron, but the latter does not give the story, which is as follows:—Shortly after Wilde had been knighted Healy met one of the Irish Members who had just returned from fulfilling his duties in Parliament. The weather was stormy, and Healy asked his friend what sort of crossing he had had. "Bad," said the M.P.; "the dirtiest night I ever saw." To which Healy gravely replied, "Indeed, it must have been wild."

Another of Cameron's friends was Matthew O'Reilly Dease, who used often to entertain Cameron to dinner at the Reform. Although they were only two, Dease always ordered a magnum of champagne, because, as he rightly said, "Champagne stores better in magnums." We hasten to add that Cameron was moderation itself and that Dease never drank more than one glass. We might go on quoting page after page of the book, but we can only congratulate Sir Charles Cameron on its appearance and recommend our readers to read it. It would be the better in places for revision; for instance, on p. 28 Sir Charles Cameron records, if we mistake not, that his wife was born on Oct. 18th, 1838, while on p. 31 he says that she was born on Oct. 26th, 1839.

NORMAL HISTOLOGY.

With Special Reference to the Structure of the Human Body. Twelfth edition. By GEORGE A. PIERSOL, M.D., Sc.D., Professor of Anatomy in the University of Pennsylvania. London and Philadelphia: J. P. Lippincott Company. With 438 illustrations, 88 of which are in colour. 1920. Pp. 418. 21s.

Professor Piersol's work will be found to be a thoroughly reliable, well-illustrated, and comprehensive exposition of "Normal Histology." Of the coloured illustrations most are in one colour, light carmine or light bluish hæmatoxylin, or methylene-blue tint. Only a few are in two colours—e.g., developing bone, injected skin, inner ear; and only two or three in more than two colours. Anyone familiar with actual well-prepared microscopic sections will at once agree that the illustrations drawn by the "skilful pencil"—to quote the author's words—of Mr. Louis Schmidt are faithful representations of well-selected, typical histological preparations. Moreover, the magnifying power is stated in each case. There are a few schemata or diagrams only, and no diagrams showing the intricate connexions of the various parts of the central nervous system. There are figures of some parts not usually illustrated in books on histology—e.g., mucous membrane of the maxillary sinus and of the frontal and sphenoidal sinuses. The drawings of the injected sections strike us as particularly accurate, but there are few diagrams to systematise the distribution of the finer blood-vessels such as used to be characteristic of the work of Professor Mall. The text is admirable and ample, and as histology has its place at the beginning of the medical curriculum in the U.S.A., some points on the gross anatomy are added—e.g., on the brain and other organs. In a short appendix a few satisfactory and thoroughly tested methods are given.

HANDBOOK OF MECHANICAL DENTISTRY.

By J. L. DUDLEY BUXTON. London: J. and A. Churchill. 1920. With 168 illustrations. Pp. 269. 16s.

THIS work does not aim at being an elaborate treatise on mechanical dentistry, but rather a guide to practical work in the surgery and laboratory. The author is clear and concise in his descriptions, and has succeeded in producing a book which should be of considerable help to both student and practitioner. There is a chapter on Dental Metallurgy by Mr. H. Terrey.

THE CARE OF CHILDREN.

Fourth edition. By ROBERT J. BLACKHAM, C.B., D.S.O., M.D., Colonel, late A.M.S. London: Scientific Press. 1920. Pp. 113. 4s. 6d.

IN these days, when new books on child culture are appearing almost every day, there is yet room for Dr. Blackham's small work, a fourth edition of which has been called for. The book has been revised and largely rewritten, a preliminary chapter on "The Child's Mother" having also been added. It is an admirable compendium of all that a mother needs to know, the chapter on communicable diseases, supplemented by an appendix giving in tabular form their main features, being one of the most useful. The book is readable and thoroughly practical, one special feature that calls for notice being the hints given on the care of children in India and abroad generally. Altogether, the volume is one that may be unreservedly recommended to all who have the charge of children.

A THOUGHT BOOK ON THE SOCRATIC METHOD.

Edited by T. SHARPER KNOWLSON. London: T. Werner Laurie. 1920. Pp. 200. 7s. 6d.

THIS book belongs to that class which Lamb called βιβλία ἀβιβλία. Mr. Knowlson remarks in his preface that he supposes that "it is the practice of every reader of books to make a more or less careful record of the thoughts that have appealed to him." The Thought Book contains a selection from his own notebook, and the principle of the book is that the reader should ask himself questions about the thoughts which Mr. Knowlson has collected for him, in accordance with a scheme of queries supplied by Mr. Knowlson, and should, in addition, make a collection of thoughts for himself and invent his own questions. We cannot see that keeping a book on these lines has any value, neither can we attach much value to Mr. Knowlson's questions. For example, on p. 43 we have a thought from Ruskin, "All education should be moral first; intellectual secondarily." Mr. Knowlson's first query is, "What is the difference between moral and intellectual education?" Anyone with a grain of intelligence would surely know the answer to this without having to think it over and write it down. As for Mr. Knowlson's method being Socratic, socratism does not consist merely in asking questions, its essence is the way in which the questions were asked and the position to which they lured the person questioned. If Mr. Knowlson will read Book IV. of Xenophon's Memorabilia he will get a good idea of what the Socratic method really was. To our minds anyone who followed Mr. Knowlson would rapidly become similar to the philosopher described by Sir George Trevelyan, who used to wander about asking "Why are we created? Whither do we tend? Have we an inner consciousness?" till all his friends when they saw him in the distance used to say, "Why was Thompkins created? Is he tending this way? Has he an inner consciousness that he is a bore?"

GRIFFIN'S CENTENARY VOLUME, 1920.

THE publishing house of Messrs. Charles Griffin and Co., 12, Exeter-street, London, produced at the close of last year a sumptuous centenary volume in which is detailed the history of the firm from its establishment in Glasgow in the year 1820. The name of the house has long been associated with the production of technological books and scientific treatises of the first order, which were thus brought within reach of all who had at heart the modernising and development of British commercial enterprise. The services rendered by "Griffin's" to the country are clearly indicated by the wide range of industries with which its publications have dealt and continue to deal; the book contains chapters written by specialists who trace the connexion of the house with such vital national activities as shipbuilding, mechanical engineering, mining, metallurgy, textiles, applied chemistry, medicine, hygiene, and sanitation. Medicine and the allied sciences, indeed, have been well represented in the lists of the firm which gave to the world such works as A. W. Blyth's "Manual of Practical Chemistry"; this book was expanded into two volumes—"Foods: their Composition and Analysis," and "Poisons: their Effects and Detection," which are to-day the accepted works of reference in courts of law. R. S. Aitchison's "Medical Handbook" and the "Surgical Handbook" of Caird and Cathcart are examples of the well-known "Pocket" Medical Series of Reference Books. Professor W. Stirling's English edition of Landois's "Textbook of Human Physiology" and the whole "Standard Medical Series" may be mentioned also as having helped to lift the name of Griffin to the high position it now occupies in the publishing world. Lord Moulton, in his foreword to the Centenary Volume, refers to the good fortune which has secured to the firm "in unbroken succession an able and enterprising head." The manner in which its history is here presented and the story itself combine to make clear the loyalty which the business has had at its command, together with the driving force and skilled direction, which have brought to it deserved prosperity.

TEXT-BOOKS ON CHEMISTRY.

Inorganic Chemistry. By JAMES WALKER, LL.D., F.R.S. Eleventh edition, revised and enlarged. London: G. Bell and Sons. 1920. Pp. 327. 5*s*.—We could not wish for a clearer outline of the principles of chemistry than is presented in this unpretentious volume. Dealing with elementary facts it is intelligibly written and, while adapted to the mental grasp of the beginner, prepares the way to a deeper study of the subject. The chapters on ionisation and the rarer elements are excellent, and illustrate the purpose of the author to keep his work up to date. The present issue is the eleventh edition, and will precede many other editions if the standard of modernisation is maintained.

Text-book of Chemistry. By R. A. WITTHAUS, A.M. Seventh revised edition by R. J. E. SCOTT, M.A., B.C.L., M.D. London: John Bale, Sons, and Danielsson. 1920. Pp. 478. 20*s*.—Written admittedly mainly for medical students, it is open to doubt whether this revised edition of a well-known book is not calculated to increase the burden of the medical curriculum. It seems to us that the book is much better adapted to the requirements of the purely chemical student. The relations of chemistry to medicine are practically ignored on the ground that the growth of such relationships is so great as to necessitate separate works on the subject. All the same the bearings might have been indicated, even if only quite briefly.

Intermediate Text-book of Chemistry. By ALEXANDER SMITH. London: G. Bell and Sons. 1920. Pp. 520. 8*s*. 6*d*.—An intermediate study of chemistry is, in our view, an erroneous proposition. Any work written within the confines of the intermediate is bound to overlap extensively both the elementary and the advanced treatment of the subject, and the trouble is indicated in this volume. Many chapters border on industrial questions, which are best dealt with in separate numbers in view of their great technical scope.

Elementary Practical Chemistry. By J. E. MYERS, D.Sc. Vict., and J. B. FIRTH, M.Sc. Vict. Second edition, revised. London: Charles Griffin and Co. 1920. Pp. 194. 4*s*. 6*d*.—This book does not aim at a novel treatment of the subject, amounting as it does to the outlining of a series of exercises at the laboratory bench which are well known. These are, however, well adapted and arranged and in good sequence for the requirements of medical students taking their first examination in practical chemistry. The directions in regard to manipulation form a satisfactory feature of the work.

Qualitative Chemical Analysis. By HENRY W. SCHIMPF, Ph.G., M.D. Third edition, revised. New York: John Wiley and Sons, Inc. London: Chapman and Hall. 1920. Pp. 187. 7*s*.—Primarily intended for students in pharmacy this systematic course of qualitative chemical analysis of inorganic and organic substances outlined in this book will be consulted with advantage by all beginners in the chemical laboratory. The comprehensive tests set out bear witness to the writer's intimate acquaintance with the trustworthy evidence for the presence or absence of the substance sought for, and a demand for a third edition is thus explained. The author is the professor of analytical chemistry in the New York Brooklyn College of Pharmacy.

Applied Chemistry. By C. KENNET H. TINKLER, D.Sc., F.I.C., and HELEN MASTERS, B.Sc. Vol. I. London: Crosby Lockwood and Son. 1920. Pp. 292. 12*s*. 6*d*.—The diploma in household and social science recently instituted by the University of London has brought this book into being. The present volume deals with water analysis, detergents, textile fabrics, bleaching agents, ventilation, fuels, paints, polishes, and so forth. A second volume is promised shortly, dealing with foods. An interesting and attractive feature of the work are the examples of experiments which deal more particularly with problems relating to household matters, not performed in the chemical but in the kitchen laboratory. The subject matter is well and clearly written, but, of course, a knowledge of chemistry is essential to intelligent reading. Students of household science will welcome this publication. It is a practical book, which should prove of general interest apart from academic calls.

Practical Chemistry. By P. A. ELLIS RICHARDS. Third edition. London: Baillière, Tindall, and Cox. 1920. Pp. 149. 5*s*.—This is eminently a book for bench work. The directions are thoroughly practical and manifest the experience of a teacher acquainted with details, careful attention to which leads to successful results. As stated in the preface, all the subject matter in the syllabus of the Conjoint Board preliminary science examination is included, while there are detection tables and volumetric analyses arranged to meet the requirements of the first examination for medical degrees of the London University. A useful section is added on elementary toxicology, and the chapters on preparation of salts are decidedly helpful. The qualitative methods have been brought into line with recent developments.

JOURNALS.

Journal of Pathology and Bacteriology. Vol. XXIII. No. 4. Pp. 371-512. December, 1920.—The Diurnal Variation in the Sizes of Red Blood Cells, by C. Price-Jones.—On the Action of X Rays upon the Transplantation of a Spontaneous Carcinoma of the Rat, by H. Chambers, G. Scott, and S. Russ. A spheroidal-celled carcinoma of the submaxillary gland in a rat failed to grow when inoculated into normal rats, though autologous grafts succeeded well. Transplantations into rats previously treated with rather large doses of X rays succeeded in a proportion of animals, and the tumour subsequently grew fairly well in normal rats.—Hæmolytic Fever, by K. Yamakami. The author believes that the rise of temperature in blackwater fever and other conditions in which hæmolysis occurs in the circulating blood is directly due to the pyrogenetic substances set free by laking the red corpuscles. Experiments on the effect of injecting laked blood and of the lysis of red corpuscles in vivo by the injection of distilled water have given varying and contradictory results. The author shows that it is a question of quantity; small doses of laked blood give no temperature change, moderate doses cause a rise of several degrees, while large doses cause a fall.—Tuberculosis of the Myocardium, by W. W. Adamson.—The Principles underlying Gram's Stain, by T. H. C. Benians. Gram-positive bacteria lose their power of retaining the

stain when they are mechanically broken up; the reaction depends therefore on the physical structure of the organism and its cell wall. A variety of experiments lead to the conclusion that the dye forms an absorption compound with the bacterial substance; this is dissociated by iodine, which forms with the dye a large molecular substance which in alcoholic solution will not readily pass through the cell wall. Some Gram-negative organisms combine with the stain, but have a membrane which lets the dye-iodine compound through (e.g., gonococcus), in others there is no real permeation by the stain (e.g., coli).—The Splenic Lesions in Splenic Anæmia, by E. H. Kettle. In five cases of splenic anæmia the spleen, removed by operation, showed at least four distinct lesions: one was Gaucher's disease, one possibly tuberculosis, two probably "Banti's disease," and one quite indeterminate. "Splenic anæmia" is evidently not a homogeneous disease. Good illustrations accompany this paper.—The Effect of Osmic Acid and other Agents on the Affinity of Receptors for Immune Bodies and on their Antigenic Properties, by M. Kosakai. Stromata of red cells treated with osmic acid absorb immune body unspecifically, but act as specific antigens.—A New Apparatus for Accurate Blood-Gas Analysis, by J. S. Haldane. A combination of the author's apparatus for oxygen-capacity determinations by ferricyanide, with the compensatory arrangement of his gas-analysis apparatus by which determinations of O_2 and CO_2 in blood, &c., can be conveniently and accurately achieved.—Observations on the Gases in Human Arterial and Venous Blood, by J. Meakins. Using Hürter's method of obtaining samples of blood by direct puncture of the radial artery with a fine needle, the author shows that on the average arterial blood is 95 per cent. saturated with oxygen; breathing air enriched with oxygen raises this to 99 per cent., while 10 minutes' respiration of air containing only 12 per cent. oxygen reduced the saturation to 81. Holding the breath for 40 seconds reduces the saturation to 74 per cent., and substantial reductions are also caused by the rapid shallow breathing which is characteristic of pneumonia and some nervous states.—Experimental Study of Gastrotoxic Serum, by Y. Miyagawa. Following out Bolton's work on gastrolytic sera, the author demonstrates the production of isogastrolysin in a proportion of animals. Rabbit *v.* guinea-pig and rabbit *v.* rabbit immune sera will both act on rabbits' and guinea-pigs' stomachs. There is no specificity between the fundus and pyloric areas.—The Effects of X Rays on Lymphocytes, by S. Russ, H. Chambers, and G. Scott. Brief exposure to X rays reduces the lymphocytes in rats' blood by some 50 per cent. after about one hour, after which there is a gradual return to the normal; further doses of rays now produce no effect.—The Pigments of the Adrenals, by G. M. Findlay. The lipochrome pigments consist of carotin and xanthophyll, and possibly a third substance; melanin is of endogenous nuclear origin. All are increased in conditions of cell depression.—The Leucocyte Changes in Pellagra and Beri-beri, by G. M. Findlay. In pellagra neutrophils are normal, lymphocytes increased; in beri-beri both are decreased.—Palatal Tumour with Structure of Mixed Parotid Tumour, by J. Ritchie.—Obituary Notice, with portrait of the late Professor A. R. Ferguson, of Cairo.

New Inventions.

INSTRUMENTS FOR THE RELIEF OF DEAFNESS.

WE have examined various instruments for the relief of deafness designed by Mr. W. H. Pettifor, telephone engineer, 11, Victoria-street, London, S.W., and shown at the London Medical Exhibition last October. Two of them are of a novel character.

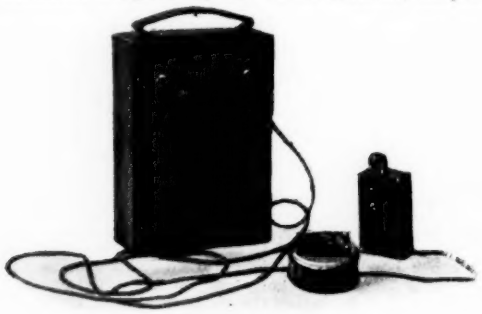


FIG. 1.—Bone Conduction Instrument.

Bone Conduction Instrument (Fig. 1).—This instrument has been designed for cases of obstructional deafness, where conduction of sound through the bone may be necessary. By lightly pressing the knob against the teeth or any part of the skull (directly behind the ear is an excellent place), vibrations are conveyed to the auditory nerves in much the same way as sound to the normal ear. The whole set comprises a transmitter, which contains a highly sensitive aperiodic microphone, a pocket battery, and the usual receiver. For purposes of practical use this instrument appears to be still in an experimental stage, but it may prove useful in a limited class of deafnesses.

Laryngeal Transmitter (Fig. 2).—This instrument consists of a transmitter which is placed against the larynx and held there by means of an adjustable band.

FIG. 2.—Laryngeal Transmitter.

This transmitter gives a very good wave-form on account of cutting out the transmitter diaphragm, thus excluding all extraneous sounds. The transmitter is connected to a small dry battery and a receiver, the latter being adjusted to give the most suitable pitch and strength. This instrument should be useful in teaching lip-reading, as the lips of the teacher are not obstructed by an instrument being held in front of them, the pupil also hearing the sound of the words. Another use to which this instrument could be put with great advantage is reading to a deaf person for a long period, as it is unnecessary to hold the transmitter, and the reader's lips can be observed. From personal trial we think this instrument likely to be of value in high degrees of middle-ear deafness.

A SIMPLE TRAY.

FINDING the need of a simple rest or tray for the impedimenta which are used in giving tuberculin injections, I have designed the tray shown in the accompanying illustration. The requisites for such an appliance are simplicity, stability, and asepticity; the tray will be found to meet these requirements. Dr. H. A. Ellis (Hackney Infirmary) has suggested to me that it would be of more value to laboratory workers if the spaces were adapted to hold slides and if a holder for test-tubes were added, and these alterations have been made.

The tray has been made for me by Messrs. Allen and Hanburys, Ltd., 48, Wigmore-street, London, W., who have constructed it to my design.

Gordon-square, London, W.C. F. E. GUNTER.

THE LANCET.

LONDON: SATURDAY, JANUARY 1, 1921.

The New Year.

THE beginning of the year is used by all thinking people, by all people that is who revise the plans of the future by the experience of the past, as a season in which it is convenient to take stock of their position; and what holds good for thinking individuals should hold good for a learned profession. But such provisions and revisions, to have full value, should not be too limited, for, as has been frequently pointed out, any tendency to regard the separate years as defined periods rather than as arbitrary subdivisions of time may lead either to unwarranted optimism or to feelings of depression which fuller consideration would not confirm. The prospect of medicine for the new year is both wide and perplexing. On the one hand, many new avenues of medical progress, and even of medical adventure, have been opened up, and large schemes, for the most part founded upon large ideas, have been laid before us; but, on the other hand, the means to traverse these avenues and the opportunities for carrying out these schemes seem, for the moment at least, to have been withdrawn. There is no money. With the roll of unemployment as it is, and with the vast demands on the country necessitated by an unprecedented war, there can be little prospect of money in large sums being forthcoming immediately for purposes of medical administration. It is clear that only the most urgent demands are likely to be satisfied, and the probability is that the satisfaction given will be but partial. And if the State is thus hampered, private individuals are no less so—disregarding prices and disregarding money values, we have only to look, as most of us are doing or have recently done, at the income-tax demands to realise how difficult it will be in the immediate future to rely in any large extent upon personal generosity. That is the pessimistic side, which we suggest may often seem less black when its shadows are steadily scrutinized.

The failure of Parliament at this juncture to attend with sympathy to the requisitions of the Ministry of Health in matters of grave national urgency is largely accounted for by the fact that the public have not appreciated the measure of that urgency; following an easy lead given to them in many places, they have fallen into the belief that the Ministry of Health, in its hurry, is willing to embark on a course of unconsidered expenditure. We believe, as well as hope, that such a view will not long prevail. It may be in the minds of our readers that much the same mental attitude was popular, and was superficially justified, upon the introduction of the National Insurance Act, but quite soon legislation for national insurance against sickness and its results was seen to be one phase in a consecutive story, the story of the development of medical practice; and though many deplored, and may still deplore, the machinery inflicted upon that development—going even so far as to speak of it as retrogression—we must own that the Insurance Act followed upon a wider understanding by the public of the essential part that medicine must play in social reform. And that is the position which to-day is more obvious than it was seven years ago. The public demand from medicine to-day, from every branch, section, and division of our calling, that we should assist in the improvement of the social, moral, and physical conditions of the State. The influential valuation of medicine is shown by the fact that day by day a medical side of things makes itself apparent, compelling from intelligent people the recognition of the spread of our science. This being so, it is perfectly impossible to believe that the difficulties with which we now struggle will remain permanent through lack of money. But while money is not forthcoming the work of medicine must not be allowed to stand still. Let us remember that if less money is available for carrying through large schemes there is less need for money in many directions, inasmuch as in the last few years a levelling down of riches has been accompanied by a levelling up of poverty. The improvement of nutrition in the London school children, and even in the condition of their teeth, which is perhaps the best criterion of early nutrition, points this out clearly enough. The effect of this levelling on the financial aspect of general practice has not yet been fully realised, but experience has somewhat unexpectedly shown a growing content with the remuneration derived from contract practice on present lines. And it would require a national cataclysm to upset the capitation basis of the large part of medical practice for the next generation.

Another consoling reflection is the increasing willingness of all ranks of society to respond to the teaching of hygiene. Grandmotherly legislation and fatherly local authorities were doubtless necessary to start, let us say, the mining community on the paths of true health; but having seen a little of what medical skill and hygienic protection may do for his happiness and efficiency, the miner, at all events, is taking his medicine seriously and is inclined to make the arrangements for himself. It seems to us that the future, if we look at it without passion or prejudice, is by no means discouraging as regards medicine in its broader aspects of national health and efficiency.

Insanity and Responsibility.

AT a recent trial at the Central Criminal Court, ALBERT JOHN BARTLETT, indicted for the murder of a woman, was found by the jury to have been guilty of the act, but to have been at the time insane and not responsible for his actions. The trial has given prominence again to the questions arising out of the rule laid down in connexion with McNaughten's case in 1843, and since followed of necessity in all such cases; this makes the crucial question in determining legal responsibility, whether the accused understood the nature and quality of his act and knew that it was wrong. Sir ROBERT ARMSTRONG-JONES, who was called for the defence by BARTLETT'S counsel, had examined the prisoner in Brixton Prison, and gave evidence as to conditions he had observed. In the course of cross-examination and of questions put to him by the judge, he expressed the view that the rule

laid down in McNaughten's case in the early half of the last century was antiquated and required revision in the light of more recent medical knowledge than was then available. Mr. Justice DARLING, in summing up to the jury, called their attention to evidence upon which, in accordance with the existing law, they might find that the accused was insane, and this they did as stated above. His lordship, however, in the course of doing this, commented upon the views of Sir ROBERT ARMSTRONG-JONES as to the accepted rule in such cases, and is reported as having said: "We take the law of England from the King's Bench, and not from Harley-street; from the House of Lords, and not from Wimpole-street or any other street." As to this, it is hardly necessary to point out that a medical witness, like any other witness, is obliged to answer truthfully questions put to him in cross-examination or by a judge. If he holds an opinion as to a rule of law, and is asked what it is, his reply can hardly be treated in fairness as an attempt on his part to dictate to the court. Apart from this, the learned judge's remark has given publicity to a question upon which many medical men hold strong opinions.

This they have as good a right to do as members of the legal profession, and their other fellow citizens, the question being not what the rule of law is but whether it falls short of being what it ought to be. The point raised may be stated, perhaps, thus: a man may be insane, even to the extent of being recognised and certified as such, so that he is detained in an asylum, and may yet be capable of knowing the nature and quality of the act of killing another, and of knowing that it is wrong. He may, however, some day commit that act, still knowing its nature and quality, and still knowing that it is wrong, but impelled thereto by insane impulse, through a defect of will-power, such impulse being irresistible, dominating, and compulsive. Sir HERBERT STEPHEN, writing from long and wide experience of criminal trials, has, inter alia, replied to this view, as stated in the *Times* by Sir ROBERT ARMSTRONG-JONES, holding that there is no need for a jury to have the question put to them, "Could he help doing it?" because, in fact and in practice, when they think that a man has acted under an insane and irresistible impulse, they always answer in the negative the question now put to them: "Did he know what he was doing and did he know it was wrong?" Such an argument will not convince those alienists who find the present law to need revision. Their view will probably be that the fact that juries find verdicts, frequently or generally, which could be shown not to be in accordance with the law, if their reasons for arriving at them could be analysed, is no reason why the law should be left without change or challenge. Their conclusion will rather be that such a condition of things points to the desirability of inquiry, in order to ascertain whether the rule should not be altered, so that it may commend itself to juries and be universally and lawfully followed.

After all, the principle to be kept in view can hardly be denied. The law permits a special verdict to be returned in the case of certain prisoners because, owing to their proved mental condition, to punish them as ordinary criminals would be contrary to justice and humanity. It is asked now whether a standard regarding the mental condition to be proved which was set up three-quarters of a century ago accurately interprets modern conceptions of what is just and humane. It seems to us quite likely that it is nothing of the sort, and at all events the serious question remains for investigation as to what weight should be given to medical as well as to legal opinion.

Occupational Hygiene and the School Medical Service.

THE annual report of the chief medical officer of the Board of Education concludes with the sentence:—

> The final product of the School Medical Service should not be a statistical record, but an alert and growing individual, equipped for the manifold functions of life, able to work with efficiency, able to enjoy life with keenness and appreciation, a healthy member of a healthy community.

Various suggestions are forthcoming as to why achievement lags so far behind intention. One is given in the current number of *School Hygiene*, a journal which has kept interest alive in the scientific aspects of school health and has had an influence outside its immediate circle. We are glad, therefore, to learn that the journal is to enjoy a renewed existence under the editorial guidance of Dr. JAMES KERR and Dr. C. W. HUTT. A valedictory article, written under the shadow of discontinuance, takes a serious view of the outlook for school hygiene as a branch of scientific knowledge, suggesting, in fact, that progress in this direction during the last decade has been almost negligible. A point is made of the crystallisation of procedure into forms and schedules, which, it is allowed, favours the accomplishment of routine, but which, at the same time has its drawbacks. These are summarised as follows:—

> "The technical work of school hygiene has been discounted by shibboleths which have placed the responsibility on medical officers of health, so that the people who know and do the work do not get the credit or hearing which they deserve. Unconsciously interest and pride in their work suffers, and now the whole status of the service has been so lowered that it may be regarded as a blind alley into which the young practitioner should only venture with the utmost circumspection. Yet school hygiene, if the methods of science were properly regarded, is of prime importance, and has a rich harvest to yield. It should even now be giving much greater value for the money spent, often indeed, in largely wasted efforts."

Fortunately the article does not stop at this harsh indictment, which fails to recognise the difficulties of administration, but proceeds to suggest the remedy—namely, that the whole field of hygiene in schools should be opened up for educational research and treatment, the Universities to recognise training in this fundamental branch of occupational hygiene and to institute a diploma in it. The proposed training would have as its basis the proper handling of statistics in investigations of distribution and association, a broad knowledge of physical conditions—heating, lighting, ventilation, and the like—and of the problems of social disease and healthy living in general. Study of fatigue symptoms and their indications, the physiological effects of food, rest, and recreation would constitute a first part of the course, to count as the equivalent of the public health

diploma course. The second part would comprise a knowledge of industrial conditions and of school hygiene, on which the industrial efficiency of the human unit primarily depends. The occupational environment of the growing child, or, in other words, educational hygiene, is still in a plastic condition, and its study would be comprehensive under this intensive attention, and include, among other things, a consideration of bodily and mental development and retardation, and the effects of artificial conditions on the growing organism.

For ourselves, we are satisfied that the position of medical officer to an Education Committee, especially if he also advises the Committee for the Care of the Mentally Defective, is one full of scientific interest. He will have, in fact, barely time to make use of all the material which passes through his hands. But the position of the assistant school medical officer, if limited to inspecting children and filling up Board of Education schedules, must obviously be monotonous. Some senior officers see to it that their juniors have clinic work as well, but the medical profession as a whole has set its face against the school medical officer undertaking any treatment except affections of the skin and minor ailments. To carry out the Education Act of 1918 will involve the employment of many more assistant medical officers, so that the individual prospect of becoming a senior in the service will become more remote. The suggestion, therefore, that the School Medical Service should be widened to include duties with regard to factories and employees is welcome, and would give more scope for research. The school doctor knows all about the young people, and is in a better position to carry out the work than the certifying factory surgeon. To sum up: Add to the school medical officer's work the supervision of young people and the care of the mentally defective, plan out a special course of study for industrial and school hygiene, provide a stimulus to research and inquiry, and in a comparatively short time the School Medical Service would not only be content, but would attract from abroad seekers after that knowledge which it is in its power to gain and to give. But the abuses to which a multiplication of special diplomas may lead are, we presume, well known to the School Medical Service, and the conditions for obtaining the projected diploma will have to be carefully thought out.

The Financial Position of the Hospitals.

A CONFERENCE of Representatives of the Honorary Staffs of Voluntary Hospitals was summoned just before Christmas by the British Medical Association. The gathering was presided over by Sir JAMES GALLOWAY in the Barnes Hall of the Royal Society of Medicine, and we give in another column a brief account of the discussion, as well as the interesting conclusions that were arrived at. At the outset of the proceedings a resolution was passed recording the view of the meeting that the voluntary method of administration is to the advantage of the public, of medical science, and the medical profession. And while various other resolutions expressed approval of State subsidies, the necessity for greater help from employers of labour, and the value of patients' contributions, one speaker, Dr. ASTLEY CLARKE, describing the position of the Leicester Royal Infirmary, was able to tell the meeting that at this institution solvency had always been maintained under the voluntary system, through the intelligent regard by the administration of the particular qualities and needs of the centre and district. Two other important points emerged from the discussion—rather from the views expressed than from the words of any resolution. First the meeting concluded that payment by the State for pensioners, or by the National Insurance Commissioners for panel patients, in no way detracted from the voluntary status of an institution. And, secondly, that it is right that the honorary staffs of voluntary hospitals should receive payment in certain circumstances, but, of course, when the claims of the hospitals for maintenance have been satisfied. The Conference is to be the prelude of similar gatherings, it being clear that it would be advisable to consider in this reasoned way many other important matters in connexion with the financial position of the hospitals. In this connexion we may refer to an important communication published this week from Dr. J. C. MUIR, medical superintendent of the Whipps Cross Hospital of the West Ham Board of Guardians. Dr. MUIR is writing in reference to the recent discussion at the Harveian Society upon the future of the Poor-law infirmaries—a discussion which will be renewed at the end of this month; but what he says has its distinct message to all who are concerned with the voluntary hospitals, for these must be affected by the elevation of the Poor-law infirmaries to general hospital rank. The question, for example, of the payment of medical staffs will enter a new phase when any practical linking-up occurs between the voluntary and the Poor-law hospitals.

A PRIZE IN OPHTHALMOLOGY.

Mr. W. EDMONDS and Miss S. EDMONDS, of Wiscombe Park, Colyton, have founded a prize in ophthalmology in memory of their brother, NICHOLAS GIFFORD EDMONDS, Lieutenant, 2nd Black Watch, who fell at Magersfontein on Dec. 11th, 1899. The prize is £100, and is awarded every two years for the best essay on a subject dealing with ophthalmology and involving original work. The competition is open to all British subjects holding the medical qualification. Subject to certain legal regulations, the management of the prize will be in the hands of a committee nominated biennially by the Medical Board of the Royal London Ophthalmic Hospital, who will select the subject of the essay and elect two examiners. The winner of the prize will have the option of giving a lecture on the subject at the Royal London Ophthalmic Hospital. The Middlemore prize, awarded triennially and run on very similar lines, has rendered valuable service to ophthalmology, and many of the prize essays remain as standard works. It may certainly be expected that this generous gift awarded biennially will also act as a strong stimulus to original work. There cannot be too many such incentives to break away from routine in professional life, and to stimulate initiative; many men have originality and power of investigation, but from lack of stimulus do not settle down to any definite line of research. The setting of a concrete subject is often all that is required to fire a man to carry out a valuable piece of work. By indicating the subject of the essay two years before the award ample time is afforded for thorough observation, carrying out experiments, and careful compilation. Mr. and Miss EDMONDS have placed the medical profession under a deep obligation by their intelligent liberality. Their wish in founding the prize is that suffering may be alleviated, and it may be confidently anticipated that this end will be attained.

Annotations.

"Ne quid nimis."

IN MEMORY OF HUXLEY.

Huxley once said that the only instruction of educative value that he had ever received was that given in the lectures on physiology delivered by Wharton Jones at Charing Cross Hospital Medical School. It is therefore peculiarly fitting for the lecture founded at Charing Cross Medical School in Huxley's memory to be delivered by a physiologist. Of the 11 lectures held since his death in 1895, three have now emanated from the heads of physiological laboratories. In 1896 Sir Michael Foster inaugurated the lectureship with a discussion of the influence on subsequent medical thought and procedure of three physiological discoveries made at about the time that Huxley was a student—the work of the brothers Weber on the inhibitory action of the vagus, the experiments of Bernard leading to the conception of the vaso-motor system, and the researches of Waller on nerve degeneration. In 1906 Professor J. P. Pavlov gave an account of his experimental investigations into the psychical faculties of the higher animals: and this year Professor Gowland Hopkins, no less illustrious than his physiological predecessors, has given the important exposition of the present ideas on nutrition which we publish on p. 1. In a few remarks introductory to his lecture Professor Hopkins spoke of the responsibility felt by him on this occasion, which was the greater inasmuch as the lectures had suffered interruption through the catastrophe which had made a breach in the continuity of most things. He pointed out that the passage of these tragic years seemed to have given a disproportionate remoteness to the life and times of Huxley; for it was now no more than a quarter of a century since Huxley died, and barely 40 years since the days of his main activities. Professor Hopkins said that to many, if not to most, of his predecessors in the lectureship, Huxley was personally known, but that he himself had no memories due to such acquaintanceship, and it was to be feared that they would not belong to many of those who would follow him. These lectures indeed were fated soon to lose a particular character which had hitherto been attached to them. A very few more years and the thoughts of the audiences would be directed towards a figure wholly historic, even as elsewhere they were directed on similar occasions to the personalities of the older heroes of medicine and of science. But yet for mid-Victorian science Huxley's gifts provided both sword and buckler. It is not too much to say that in those days the younger biologists, while profiting from his scientific labours, worked with a definite sense of his protection. Professor Hopkins voiced the regret of us all that in his peculiar position as the champion of scientific aims Huxley has had no true successor. His pen would have seen to it that the services of science to the nation during the war should not fade from the public memory as they are fading to-day. We miss the gifts we commemorate.

CHRONIC GASTRIC DISORDERS.

SPEAKING from an experience of nearly 30 years and almost a thousand hospital gastric cases, Mr. A. E. Maylard, in the first of three interesting James Watson lectures delivered last year in Glasgow, and now published in booklet form, deals with chronic gastric disorders dependent upon other causes than those of an ulcerative, carcinomatous, or obstructive nature; and he points out that, owing to the great successes of gastric surgery during the last 25 years, a large number of patients come under the care of the surgeon for gastric symptoms which are not due to organic disease of the stomach or duodenum. Therefore, he draws attention to the care required in diagnosis and the need for collaboration between physician and surgeon, so that operations should not be undertaken for gastric symptoms due to organic or functional disease of the nervous system, such as locomotor ataxy, hysteria, neurasthenia, or to such distant sources of infection as dental caries and diseases of the nasal sinuses. He speaks of three primary essentials to be cleared up in every case:—

"(1) Whether it is the stomach itself that is the cause of the symptoms; (2) whether it has become the seat of functional or organic derangement as the result of mischief elsewhere; or (3) whether the symptoms are merely apparently connected with the viscus; that is to say, the stomach is quite healthy in itself, but the symptoms which appear to be gastric are merely the referred indications of disease in some other part of the body."

The need is also pointed out for regarding an operation for gastric symptoms as an exploration of the whole abdomen, so that causes of reflex gastric symptoms, such as cholecystitis, chronic pancreatitis, and diseases of the intestines, appendix, and female genital organs, may not be overlooked. Mr. Maylard considers that the frequency and importance of appendical dyspepsia has been greatly exaggerated. In many cases an exploration is still necessary to settle the diagnosis, so that organic disease, such as chronic ulcer and carcinoma, may be found and treated in its early and hopeful stages.

For the treatment of chronic gastric ulcer Mr. Maylard leans to partial gastrectomy, disregarding the teaching of long experience that gastro-jejunostomy, with or without excision or cauterisation of the ulcer, cures the large majority of these patients with a much smaller risk. For diagnosis he relies chiefly on the clinical symptoms and expert radiographic examination. He does not believe much in "test-meals," but apparently has no experience of repeated examinations at short intervals after a meal—a method which, when well established, may make us all change our views. For duodenal ulcer he recommends that "if the part of the duodenum implicated cannot be freely mobilised so that the involved bowel can be excised, gastro-jejunostomy must alone suffice," but excision of the ulcer-bearing area appears to us unnecessarily severe, especially when such a comparatively safe and simple operation as gastro-jejunostomy cures over 90 per cent. When there has been serious hæmorrhage Mr. Maylard recommends, in addition, exclusion of the duodenum by "completely severing the stomach at its pyloric extremity," because he believes that bleeding is less likely to recur when the food cannot pass over the ulcer and the peristaltic wave may be interrupted.

With regard to gastric carcinoma he quotes Dr. C. H. Mayo:—

"The most common cancer is that of the stomach. More than one-third of the cancer in men, and more than one-fifth of the cancer in women appear in this organ; and, inasmuch as the condition in nearly one-half of such patients who come to the physician for examination is inoperable, there is room for some improvement in the matter of securing earlier recognition of the disease" (*Annals of Surgery*, 1919, p. 236).

He also advocates that steps should be taken to educate the public upon this subject, so that patients should seek treatment while the disease is in its early stages. Mr. Maylard divides the causes of pyloric obstruction into anatomical and pathological, the latter depending on new growths. As regards the former, he pointed out in 1904 that, quite apart from congenital hypertrophic stenosis of the pylorus, a developmental narrowing of the orifice existed in some cases, and very gradually gave rise to obstructive symptoms. He has himself operated on 36 patients suffering from this condition with satisfactory results. Landerer had previously and independently drawn attention to the same condition, which is due to an excess of reduplication of the pyloric fold whereby the width of the valve is increased and the channel diminished, so that it will not admit the index finger. As a result of this partial obstruction the stomach hypertrophies and ultimately dilates when the muscular power gradually diminishes. For this condition Mr. Maylard prefers gastro-jejunostomy to Finney's operation, and he advocates gastro-jejunostomy also for ordinary pyloric obstruction following ulceration; in this case he makes his anastomosis

as near the pylorus as possible. Mr. Maylard does good service by again drawing attention to the variable and often misleading symptoms and radiographic appearances of partial pyloric obstruction, the symptoms and signs often disappearing when the patient is at rest under good conditions, only to reappear when he returns to work. Mr. Maylard strongly advises operation when the symptoms of undoubted gastric disease do not completely recover after a reasonable period of conservative treatment, in order to avoid the serious consequences of delay in cases of ulcer, carcinoma, or obstruction.

SILICOSIS ON THE RAND.

THE main interest of the report just published [1] of the South African Miners' Phthisis Board for the year ending July 31st, 1919, lies in the portion contributed by Dr. W. Watkins-Pitchford, chairman of the Medical Bureau. The importance of the work which is being conducted on the Rand in relation to silicosis may be appreciated from the statement that 4600 persons were, during the year, submitted to the careful examination required before men are permitted to commence work underground, while some 15,000 men are being kept under regular observation at periodical examinations. Indeed the activities of the Board probably represent the most complete and intensive inquiry ever made into the occurrence of any disease, and their annual reports must gather in interest as time goes by. Unfortunately for medical science, the period now reported upon was interfered with by the enlistment and subsequent return to the goldfields of many miners. Nevertheless, even this interruption in the normal course of employment has been utilised to throw light on the occurrence of the disease. Thus, in some instances,

"miners of many years' standing, who had but slight apparent damage to the lungs on leaving, showed definite physical signs upon their return from military service; and in more than one instance a miner of long service, who left with apparently a normal chest, returned in a condition of fully developed primary silicosis."

Development of silicosis in the absence of exposure to risk had previously been suspected, now it is a proven fact. A further important point must now also be accepted, namely, that—

"Tuberculous infection will often bring about a rapid development of silicotic changes in the lungs of a miner who has habitually inhaled siliceous dust but who may have hitherto shown little or no indication of pulmonary damage. ..... In these cases one might almost say that the *tuberculosis has 'predisposed' to the silicosis*; such a statement is, indeed, true in its literal sense with respect to men who are the subjects of tuberculosis before they begin hard-rock mining."

The statistics quoted do not yet indicate any beneficial results from the recent improved conditions of underground work. This is due partly to war-time interference with employment which has rendered comparison with figures of former years impossible, and partly to the fact that results are not yet due in a disease with so slow an onset. "We have, meanwhile, to gather the residue of the evil crop which sprang from the ignorance and indifference of the past." The value of initial examination, which commenced September, 1916, and has been applied to 5175 men (of whom 2741 are known to be in underground employment), is clearly shown by the fact that only one has developed tuberculosis and no one silicosis. If this remarkable record is maintained the disease will be swiftly eradicated from the mines. Meanwhile although the toll it is taking of those at work before 1916 remains high—viz., 55 cases of silicosis or of silicosis with tuberculosis per 1000 working miners—"of a total of 3166 men who had worked, on the average, for a period of nine years and six months, only 349, *not all*, had become silicotic; the proportion was only 1 in every 9, or 11 per cent."; while of these silicotic cases only 15·6 per cent. were affected with tuberculosis—the complication without which silicosis would be a comparatively innocuous pathological condition. We await further reports, which must be of great moment to all those concerned with the administration of schemes under our own Workmen's Compensation (Silicosis) Act of 1918.

[1] Annual Report of Miners' Phthisis Board, Union of South Africa Capetown, 1920. 6s.

EFFECTIVE X RAY THERAPEUTICS.

AT the December meeting of the Section of Electro-therapeutics of the Royal Society of Medicine (p. 24) a description was given by Dr. Reginald Morton of a system of treatment, primarily aimed at the cure of uterine carcinoma, that may have a profound influence upon radiological and surgical procedure in the treatment of malignant disease in general. Dr. Morton spent a week in the Women's Clinic at Erlangen studying the methods there employed, and he came away with the conviction that the apparatus and technique constitute a real advance in radiology. No new principle is involved, but special tubes have been designed to give a greater degree of penetration and intensity than has hitherto been available. Until now the loss of radiation by dispersion and absorption has been sufficient almost to nullify any effort to destroy deeply seated malignant growth. With the system here described, for which Privat-dozent Dr. Hermann Wintz (who succeeds Dr. L. Seitz as professor at the end of the present session) is mainly responsible, nearly 20 per cent. of the skin dose is transmitted to a depth of 10 cm.; hence by using simultaneously a number of portals of entry for the rays the treatment of central carcinoma becomes practicable, for it has been found that a cancerous growth will disappear if its whole mass has been subjected to a dose only slightly in excess of that which normal skin will stand without serious injury. Over 80 per cent. of cases of uterine carcinoma, with more or less involvement of the parametria, treated by this method alone during the year 1918, are still well and leading normal lives. It is the same with 75 per cent. of cases of mammary carcinoma treated without operation during 1917. The method is, of course, inapplicable after general dissemination has occurred, but it is not too much to hope that most cases of malignant disease will come under skilled observation before this serious condition arrives.

Another class of disease that has given excellent results with this method of treatment is the tuberculous gland and joint, especially in young subjects where the disease has not progressed to actual destruction. A notable feature of the system is the high degree of accuracy in the dosage. Nothing is haphazard; every dose is a separate calculation, and the whole procedure is standardised so far as the present state of knowledge permits. We are gratified to learn that similar equipment is being installed in at least two London hospitals, so that the advantages of these discoveries will soon be available for all. The results will be watched with keen interest.

GONOCOCCAL ENDOCARDITIS IN A CHILD.

SINCE Thayer and his associates at the Johns Hopkins Hospital established the specific nature of the endocarditis occurring in gonorrhœa many cases have been studied in adults, but the complication in the gonorrhœal vaginitis of children is rare. In the *Journal of the American Medical Association* of Dec. 11th Dr. H. L. Dwyer has reported the case of a girl, aged 23 months, who was admitted to hospital with painful swelling of the left ankle and wrist.

The illness began three weeks before with pain, swelling in left foot, fever, and vaginal discharge. A friend living with the family also had a vaginal discharge. The child was poorly nourished and irritable. Moving the limbs caused great pain. The skin was yellow and the sclerotics were of a greenish-yellow tint suggesting jaundice. The left ankle and wrist were swollen and very painful. In the lumbo-sacral region was a superficial abscess 2 inches in diameter. A vaginal discharge was present. The apex beat was just inside the nipple line in the fourth interspace. The heart was beating rapidly and irregularly. A soft blowing systolic murmur was audible over the entire cardiac area, was heard best at the apex, and was transmitted to the axilla. The abdomen was distended. The temperature was 104°,

pulse 140, and respirations 42. Smears from the discharge showed many Gram-negative intracellular diplococci. The abscess was opened, and similar organisms were found in the pus. A culture from the blood also showed them. Under rest the pains in the joints subsided, as did the abdominal distension. The spleen could then be felt to extend 2 inches below the ribs. The cardiac murmur became harsh and intensified, and death took place on the seventh day in hospital. The necropsy showed greenish-yellow cauliflower vegetations on the free borders of the mitral valve. Cover-glass preparations from the valve revealed Gram-negative diplococci.

Gonococcal endocarditis in children is rare. Satterthwaite in 100 cases of endocarditis in New York children found only one due to the gonococcus. Abscess in the subcutaneous tissue or in muscle has been observed in a few cases of gonorrhœa. Dr. Dwyer suggests that the abscess in the sacral region in his case was the result of localisation of organisms from the blood stream due to lowered resistance in that area from pressure. The usual features of gonococcal endocarditis are irregular intermittent fever, chills, and anæmia, and do not differ from those observed in endocarditis due to other organisms. An increase in the intensity of the murmur from day to day, such as was found in the present case, has been noted by several observers.

THE EAR AS PROTOTYPE OF THE TORPEDO.

Dr. H. Hartridge, in the *Journal of Physiology* (vol. liv., No. 4), offers an ingenious suggestion to account for the well-known association in the inner ear of such diverse and differently constituted apparatus as the semicircular canals, the otolith mechanisms on the one hand, and the cochlea with its adjuvant fenestræ, fluids, and middle-ear chain of ossicles on the other. The suggestion is that the mammalian organ subserved in the ancestors of mammals the function of perceiving depth below water surface, and was therefore associated with the semicircular canals and otolith organs in the identification of position and direction of travel. As the author shows, there is a close mechanical analogy between the auditory apparatus of mammals and the depth-controlling gear of the naval torpedo. In the latter are two mechanisms which operate together to control the depth at which the projectile shall travel beneath the surface of the water. 1. A pendulum under the influence of gravity records any deflection that the long axis of the torpedo may make with the horizontal, and if such deflection exists it turns the horizontal rudders in such a direction that the deflection tends to be corrected. 2. A hydrostatic membrane, a sheet-rubber diaphragm, situated in the side of the torpedo in contact with the water outside and on the inside with the air-filled interior. As the torpedo gets deeper in the water the hydrostatic pressure tends to press the diaphragm inwards against a resisting spring. If the torpedo is at the correct depth at which it is required to travel, the hydrostatic pressure produces a force on the diaphragm that is just balanced by the force exerted in the opposite direction by the spring; but if the torpedo gets too deep or too shallow the forces no longer balance, and the diaphragm is pressed inwards or allowed to move outwards respectively, and this causes appropriate deflection of the rudders. If pendulum and hydrostatic membrane operate together, it is found by experiment that the one eliminates the tendency to deflection caused by the other, and the torpedo is thus caused to travel along a straight path at a given distance under the surface. Applying these results to the fish, the latter for the proper direction of its path in three dimensions in space would require at least a mechanism to give information concerning depth below surface and one to be influenced by gravity, and therefore to show deflection from the horizontal axis. The latter mechanism is identified as the otolith organ. Dr. Hartridge suggests that the tympanum, middle ear, and cochlea are to be identified as the depth-recording mechanisms, the tympanum being the counterpart of the rubber hydrostatic membrane of the torpedo, the ear ossicles the counterpart of the levers which transmit the motion of the diaphragm under varying hydrostatic pressure to the rudder-control mechanism, the stapedius muscle acting as the spring which in the torpedo balances the forces produced in the diaphragm by the hydrostatic pressure. Any mechanism for recording changes in hydrostatic pressure has a fluid—e.g., water on one side of the diaphragm, and a readily compressible fluid, gas, or air on the other side, with arrangements for renewing the air, as it is liable to be absorbed. In shallow water fish and in most reptilia the renewal of air in the middle ear is readily affected by the fish coming to the surface of the water and taking in the air and equalising the tension by the mouth and Eustachian tubes. In some fish the air in the swim bladder is renewed in a similar way. In certain fish living below the surface there is a special connexion with the gas-secreting gland, the swim bladder. In many osseous fishes this is effected through a connexion between the swim bladder and the middle ear by means of a tube, or the swim bladder itself forms the chamber, the change in volume of which (with change of depth below surface) brings about movements in the mechanism which connects with the middle ear, as in carp, loche, and sleat-fish. The remarkable mechanism of articulated bones which connects the ear and the swim bladder in the Siluridæ seems to be associated with the perception of depth and not with audition—and is for measuring air-bladder volume under changes of hydrostatic pressure. The view is advanced that the auditory apparatus of mammalia, which is represented by the cochlea, fenestræ, ossicles, and tympanum, once formed in their ancestors an apparatus for perceiving not sound vibrations but the depths below sea-level. Granting this, it would explain why the cochlea, semicircular canals, and the otolith organs are associated together anatomically, and have a common nerve; and if the cochlea perceives depth below surface all three will be directly concerned with the perception of position and the control of direction.

INDIGENOUS MALIGNANT TERTIAN MALARIA.

A CASE of malignant tertian malaria contracted by a resident of Liverpool and ending fatally was reported by Professor E. E. Glynn and Dr. J. C. Matthews at a recent meeting of the Liverpool Medical Institution. The case is of unusual importance on more than one ground. Not only is it the first recorded instance of indigenous malignant tertian malaria occurring in England since our knowledge of the differentiation of the various forms of malaria has attained its present high degree of precision, but the disease was contracted in a district considerably to the north of the areas where indigenous malaria has in past times been prevalent. Further, the case stands alone as the only reported instance of fatal indigenous malaria of recent years. The patient was a girl, aged 18; she was a native of Liverpool, and had lived in the same house in the town for ten years. Apart from anæmia, she was well and active up to a fortnight previous to her death. Two days before the onset of her illness she spent some hours in a valley which was subsequently found to harbour large numbers of hibernating larval and adult anopheline mosquitoes, but it is more than probable that she had become infected before this date, as anopheline mosquitoes are known to occur in one of the parks and the country round Liverpool where she was accustomed to walk. No suspicions were entertained as to the nature of her illness, and she died two hours after admission to the Liverpool Royal Infirmary on the fourteenth day from the onset of symptoms. Beyond considerable enlargement of the spleen, which was noted to be "dark, rather like malaria," the naked-eye appearances of the organs after death presented no characteristic features, and it was only on microscopic examination of blood films and smears from the bone marrow and spleen that the nature of the case became evident. Organisms resembling degenerated crescents were present in the bone marrow, and in blood-films and smears from the spleen a large number of segmenting malignant tertian parasites were discovered. Specimens showing crescent-

and segmenting parasites were exhibited at the laboratory meeting (see p. 26) of the Royal Society of Tropical Medicine and Hygiene in London. Subsequent examination of additional material showed numerous crescents in the bone marrow and a moderate number in the spleen and blood smears. The differential count of a post-mortem blood-film gave only 10 per cent. of polymorphonuclear cells, 28·2 per cent. lymphocytes, and 61·4 per cent. mononuclears. The diagnosis of malignant tertian malaria may therefore be regarded as abundantly proved: that the case was indigenous also admits of no question, and it is a matter of fair inference that the mosquito from which infection was derived had itself become infected from one of the many victims of malignant tertian malaria who have arrived in this country from abroad.

Although, as is remarked by the authors, it is probable that this is not the only case of malignant tertian malaria that has recently occurred in England, our climatic conditions are such that it is unlikely that cases of the kind are, or ever will be, other than exceptional. Lieutenant-Colonel S. P. James, I.M.S., showed some specimens to illustrate true indigenous malaria at the laboratory meeting to which we have referred. Even in France, under far more favourable climatic circumstances, very few cases of indigenous malignant tertian infection have so far been reported. Roubaud[1] has referred to isolated cases of infection, and slight epidemics of locally acquired malaria have been recently notified from various parts of France; usually the infection was with *Plasmodium vivax*, but he states that in some cases *P. falciparum* was equally the cause. Also Lagriffoul and Picard[2] record a locally acquired case due to infection with *P. falciparum*. These authors remark that the presence of locally acquired malignant tertian malaria in France should occasion no surprise, since it is known that in Macedonia it spreads in regions where the summer and autumn are not warmer than in the French Mediterranean region. Further, it was reported by Roux at a Plenary Session of the Sanitary Conference of the Allied Powers held in Paris in March, 1919, that of one group of 170 cases of malaria locally contracted in France during the summer and autumn of 1917, five were infections with *P. falciparum*. It should be observed that the heavy incidence of malignant tertian malaria in Macedonia occurs at a latitude considerably south of the southern limits of France, and, notwithstanding the statement quoted above, it is unlikely that the heat of summer on the French littoral approaches in length or severity that of the Struma and Vardar valleys.

FAT-METABOLISM OF INFANTS AND YOUNG CHILDREN.

THE connexion between abnormal stools in infants and defective fat-digestion has long been a subject of debate among pædiatricians. Any approach to accurate estimations of the alterations from the normal fat-content of fæces has been hindered by a lack of standard figures for healthy subjects which could be accepted as the normal in England. In the last two years a couple of important contributions to this subject have appeared, the first in America and the other in England. During 1919 L. Emmett Holt, working with Angelia M. Courtney and Helen L. Fales, gave the results of laborious investigations on the normal and abnormal fat-metabolism of infants and young children in a series of papers first appearing in the *American Journal of Children's Diseases*, and now reprinted together in the volume of Studies from the Rockefeller Institute for Medical Research for 1920 (vol. xxxiv.). Starting with the examination of the stools of a number of healthy breast-fed infants, the authors found that, although over 90 per cent. of the food-fat was absorbed, the dried fæces contained on an average as much as 34·5 per cent. of fat. Of this fæcal fat 15–20 per cent. was in the form of neutral fat, and about 50 per cent. in the form of soap. In healthy babies fed on modifications of cow's milk the digestion of fat appeared to be about as satisfactorily carried out as in the breast-fed, though such slight differences as were found were in favour of the latter. Constipation made very little difference to the proportion or splitting of the fæcal fat, but in the presence of diarrhœa the amount of fat wasted in the stools was increased and the proportion of soaps lowered, as might be expected with hurried and imperfect digestion. In the third and fourth of their papers the authors investigated the fat-metabolism of older children. On a diet of milk only, or of milk and cereal, the amount of fat in the stools was lower than that of the infants, but still reached a figure of 30 per cent. On a mixed diet this proportion was lessened to 18–20 per cent. This figure still seems a high one if we compare it with the 14·5 per cent. found in the case reported by Garrod and Hurtley,[1] of a normal boy on a mixed diet rich in fat. In rachitic children the American authors found a slightly increased fat loss, and in chronic intestinal indigestion the wastage was considerably increased. Finally, the important question of substitutes for butter-fat was considered. It was found that nut-butter and corn-oil were both well absorbed, and that to a considerable degree they may be safely substituted for the more expensive milk-fat. The authors are careful (on the evidence submitted we might almost say scrupulous) to state that vegetable fats must never be allowed entirely to replace the animal fat of the diet. How much of the latter must be taken to provide the necessary amount of fat-soluble vitamine they hazard no opinion. Another valuable paper dealing with the same subject was published by H. S. Hutchison[2] in April, 1920. This author, investigating independently in Glasgow, reaches figures closely agreeing with the American results as regards the absorption and digestion of fat in infants and young children. He finds that in rickets the excess loss of fat daily compared to that in healthy subjects averages 0·6 g., an amount which is sufficient to affect nutrition. In infantile atrophy he found no true defect in fat-absorption. He lays great stress upon the importance of ascertaining the daily weight of the stools before attempting to judge whether fat-absorption is normal or defective. It is evident that percentage estimations alone may lead to wrong conclusions in this matter, and that before a balance can be struck, the daily intake and output of fat must both be known. These two sets of investigations, agreeing closely with one another, certainly serve to establish a standard set of figures for the fat-metabolism of normal infants.

[1] Annales de l'Institut Pasteur, vol. xxxii., 1918, September, No. 9.
[2] Bulletin Soc. Path. Exotique, Paris, vol. x., No. 10, December, 1917.

"SNOW-BLINDNESS."

A PAPER by Lieutenant-Commander E. L. Atkinson, read before the War Section of the Royal Society of Medicine (see p. 24), throws some fresh light on this subject, gained partly during service with Scott's Antarctic Expedition, 1911–1913, and partly in North Russia in 1919. As is well known, the ordinary symptoms are photophobia, lacrymation, and chemosis, coming on after an interval of several hours. In Commander Atkinson's experience the symptoms came on more rapidly, especially on entering a tent where a primus stove was burning. They also included slight hyperæmia of the retina, and later small corneal ulcers. Recovery, however, was the rule. The rays which cause "snow-blindness" are generally admitted to be the ultra-violet ones, which, being absorbed almost entirely by the cornea and lens, can in themselves have no direct action on the retina. Their action, however, was intensified by the excessive illumination of the Antarctic region, due to the countless ice crystals reflecting light into the eye from all directions. Exposure of the eyes for as little as 15 minutes to these conditions was enough to cause the symptoms. In certain cases another symptom followed—namely, diplopia. This was probably due to the excessive strain on the external ocular muscles caused by the unusual diffusion of light, resulting in the absence of any

[1] Quarterly Journal of Medicine, 1912–13, vi., 249. Ibid., 1919–20, xiii., 247.

stimulus making for the fixation of the two eyes on a single point. Prevention is easily attained by the use of glasses, which cut off some of the light rays and all of the ultra-violet ones. Probably the most effective are Crookes's glasses No. 2, and for long expeditions they should be provided with side-pieces to cut off the lateral light. For ordinary holiday-makers, such as the fortunate people who are about to spend a few weeks in the Swiss ski-ing and skating resorts, ordinary smoked glasses will be generally found to answer the purpose sufficiently well.

PSYCHONEUROSIS, SYMPATHETIC AND ENDOCRIN.

ALL interested in psychological medicine will welcome a brochure entitled, "Functional Mental Illness and the Interdependence of the Sympathetic and Central Nervous System in Relation to the Psychoneuroses," by Dr. R. G. Rows and Dr. David Orr,[1] reprinted from the *Edinburgh Medical Journal*, the first, we believe, published by these original and devoted workers since army medical duties claimed all their energies. The present work is a courageous attempt to bring into relation the central nervous system, the sympathetic and autonomic systems, the endocrine organs with the effects of emotion and mental strain. The whole trend of the two essays is frankly appreciative of modern psychological investigation. The value of the teachings of Freud is recognised, but it does not appear from the cases recorded that orthodox Freudian psycho-analysis was practised, though it is evident they consider careful psychological investigations of repressed ideas essential for successful treatment. They point out that repressed emotions and conflicts are accompanied by disturbance of nervous function, and they outline a mechanism by which psychical trauma directly produces changes in structure, thus throwing light on the inscrutable problem of the relations between mind and matter. It is claimed that the sympathetic system is represented in the cerebral cortex, and that emotion and stress through the sympathetic affect the endocrine organs, and that these liberate hormones which affect all the bodily tissues. In this way a vicious circle may be produced. Dr. Rows deprecates the collection of symptoms under names such as dementia præcox, which he regards as a sterile procedure. Recent research shows that the body works as a whole, and three principles must be recognised: (1) the importance of the autonomic and sympathetic systems; (2) the special activities of the endocrine organs; (3) the correlation of the latter with the sympathetic system. From the concluding words of Dr. Rows's essay, as from one of Dr. Orr's opening sentences, it seems fair to infer that both authors consider that insanity could be prevented if it were properly treated in its early stages. Unfortunately, the time has not yet come when such sweeping assertions can be justified. All will agree that it is of the utmost importance to investigate and treat the earliest sign of mental disturbance, and no doubt in many cases further trouble may thereby be prevented, but there is little real evidence that any large proportion of confirmed mental disease is preventable. Admitting to the full the value of analysis in obtaining insight into the meaning of symptoms, it is a long step to conclude that the elucidation of psychological mechanisms is necessarily curative. Any such conclusion ignores innate degeneration, unstable mental constitution, the influence of toxic disturbance, and the possibility of gross disease of other organs reacting unfavourably upon nervous tissues.

Whilst optimistic teaching is much wanted in psychological medicine, and the worst that can happen is that we should sink into a laissez-faire attitude, yet true advance is always hindered by over-statement. It is surely fallacious to teach that if a patient were treated on some specific lines at the beginning all would have been well; such teaching recalls the charlatan who, called to a hopeless case, says impressively, "It is too late. ..... If I had only been called in earlier." There is abundance of evidence to show that modern psychological methods even in the most approved hands are not always successful. Pensions boards have still to give full pensions to ex-soldiers who have been discharged recovered from neurological war hospitals, and mental hospitals are still receiving the products of the most approved psychological treatment. To paraphrase Jowett's famous saying, "No treatment is infallible, not even the newest." Whether the psychoses develop from a primary condition essentially akin to that which produces the psychoneuroses is a question that remains unanswered. Dr. Orr's article is an excellent résumé of recent work, throwing light on the relation between the vegetative nervous system and the endocrine organs, and the effect of emotion upon both; but the inexperienced reader would be helped if the limitations of our knowledge were pointed out more plainly. Taken as a whole, the argument running through both papers is a timely contribution to our knowledge. It is helpful to have brought out for us so plainly the importance both of modern psychological methods of investigation and the value of the study of the sympathetic-endocrine system, and to learn that, in some measure at any rate, these can be correlated. We can, as Dr. Orr concludes, no longer regard psychoneuroses as psychic disturbances in the narrow sense employed in the past.

[1] Edinburgh: Oliver and Boyd. 3*s*. 6*d*.

THE SIZE OF RED BLOOD CORPUSCLES.

IT might easily be supposed that the dried blood film had by this time yielded most of its secrets. Dr. C. Price-Jones, however, shows[1] that something fresh may yet be got from it. By careful measurements he finds that the average diameter of the red cells on first waking in the morning is about 0·5μ less than during ordinary waking hours; it soon increases after getting up, and by about noon reaches a maximum which is maintained till bed-time. Violent exercise superimposes on this diurnal curve a sudden increase with a rapid return to normal; gentle exercise has no obvious effect. The suggestion that the corpuscles swell when the blood becomes more acid and shrink when it becomes more alkaline was confirmed by experiments in vitro in which lactic acid, CO_2, and sodium carbonate were added to defibrinated blood. Particularly striking are the changes produced by forced breathing in which the alkalinity is increased by washing out CO_2; the cells immediately shrink, and almost as quickly regain their normal size. Dr. Price-Jones suggests that the increased size of the cells in venous blood, known long since to Limbeck and Hamburger, is an ingenious arrangement whereby their passage through the lungs is delayed until the excess of CO_2 is discharged.

DERMATITIS DYSMENORRHŒICA.

IN a review of this subject Dr. Fred Wise and Dr. H. J. Parkhurst,[2] of New York, remark that ever since the article by Matzenauer and Pollitzer in 1912 on dermatitis dysmenorrhœica there has been much controversy among dermatologists as to the genuineness of this rare affection. The clinical symptoms consist in a burning sensation of the skin, accompanied by an urticaria-like swelling of a faint rose-red colour which differentiates the condition from the more intense scarlet of other inflammatory processes. Within a quarter to half an hour later a further stage of development occurs: the follicles stand out more distinctly, each being surrounded by an anæmic zone. This appearance is soon followed by an exudation of serum into the follicular orifice, and subsequently a thin yellowish-brown crust forms. A superficial desquamation about the follicles ensues, especially in the more acute cases. The follicles being close together, these vesicular areas soon coalesce to form patches of weeping dermatitis or yellow crust-covered lesions simulating traumatic excoriations. The further manifestations are either secondary or the result of involution of the lesions. Rubbing or scratching may cause superficial excoriations or slight hæmorrhages, thus intensifying the inflam-

[1] Journal of Pathology and Bacteriology, vol. xxiii., p. 371.

[2] Archives of Dermatology and Syphilology, December, 1920.

matory process and causing increased exudation and crust formation. Usually the necrosis reaches no further than the rete Malpighii, and healing occurs within three or four days, but in the more severe cases the necrosis may extend deeply, resulting in the formation of hypertrophic scars and keloids. Any part of the body may be affected, but the face is the area of predilection. In one of Matzenauer's and Pollitzer's patients there was a coincident eruption of the lingual and buccal mucosæ. The lesions, which are almost always symmetrical in distribution, are usually round or oval on the cheeks and buttocks and linear on the extremities. The patient seen by Dr. Wise and Dr. Parkhurst was a woman, aged 30, who suffered from dysmenorrhœa, each menstrual period being accompanied by a regularly recurrent eruption manifested by œdema, erythema, follicular hæmorrhage, crusting, and pigmentation. Between the menstrual periods and in pregnancy the eruption was in abeyance. The writers were convinced that malingering played no part in the causation of the dermatosis.

BEETHOVEN'S DISEASES.

IN a paper published under this title on the 150th anniversary of Beethoven's birth Dr. Schweisheimer,[1] of Munich, discusses the pathological history of Beethoven. His tragic ear disease, which dated back to the age of 28, and probably earlier, first involved the left and then the right ear. At an early date he was unable to hear the high tones of instruments or singing at any distance. This fact, combined with the progressive character of the disease, indicates that the ear affection was not otosclerosis, as might at first be supposed, but a disorder of the internal ear, of which early lowering of the upper tone limits is characteristic. As there was no history of attacks of giddiness or other disturbance of equilibrium the cochlear nerve must have been principally affected. There was no indication of the middle ear having been primarily attacked. The auditory centre in the brain was not involved. The cause of the deafness can only be conjectured. There is nothing in Beethoven's history pointing to an infectious origin for the acoustic neuritis, and toxic and traumatic factors could be excluded. Dr. Schweisheimer suggests that there was a constitutional weakness of the auditory nerve, which developed as time went on, and was possibly due, in part at least, to hereditary taint. Beethoven's father and maternal grandmother were drinkers, and his mother is said to have died of consumption. There was no history of deafness in the family. Apart from minor ailments, such as a whitlow, which interfered with playing the piano, and a moderate degree of myopia, Beethoven began to suffer at a comparatively early date from symptoms of cirrhosis of the liver, for which indulgence in punch was probably responsible. In his later years œdema of the legs and ascites developed, giving rise to dyspnœal attacks from pressure on the diaphragm. Paracentesis abdominis was performed on four occasions, but relief was only temporary, and death took place at the age of 56. The necropsy, which was performed by Dr. Johannes Wagner, of the Vienna Pathological Museum, showed atrophy of the auditory nerves and atrophic cirrhosis of the liver.

THE executive committee of the War Emergency Fund of the Royal Medical Benevolent Fund announces that it is now prepared to make grants for the daughters of medical men in circumstances similar to those which have entitled applicants to grants for the education of their sons. Applications for grants should be made to the honorary secretary, War Emergency Fund, 11, Chandos-street, Cavendish-square, London, W. 1. The Fund has made several substantial grants to defray in whole or in part the school fees of the sons of medical men who, after resuming civil practice, find themselves in temporary financial difficulty owing to war service.

[1] Münchener Medizinische Wochenschrift, Dec. 17th, 1920.

FINANCIAL POSITION OF HOSPITALS.

A CONFERENCE of the Representatives of the Honorary Medical Staffs of Voluntary Hospitals was held on Dec. 21st, 1920, at the Royal Society of Medicine, under the chairmanship of Sir JAMES GALLOWAY, senior physician to Charing Cross Hospital. The conference arose out of the action of the Minister of Health in appointing a Committee to inquire into the financial position of the voluntary hospitals of the country, when withdrawing or modifying Clause 11 in the Ministry of Health (Miscellaneous Provisions) Bill, which would have enabled county councils to take over the Poor-law infirmaries and run them as general hospitals at the expense of the ratepayers. The conference was called by the British Medical Association.

The first resolution before the conference was put by Mr. BISHOP HARMAN, Chairman of the Hospitals Committee of the British Medical Association, and was seconded by Sir HENRY DAVY. The motion after verbal alteration ran as follows:—

> That this conference of the staffs of voluntary hospitals called by the British Medical Association desires to record its belief that the voluntary method of administration of the voluntary hospitals of the country is to the advantage of the public, of medical science, and of the medical profession, and that it should be maintained.

The motion was supported generally by Sir HAMILTON BALLANCE (Norfolk and Norwich Hospital), who, however, asked whether institutions had been taken into account in the motion which received subsidies from the State for specific purposes, such as education grants or payments from the National Insurance Commission and Ministry of Pensions.

Mr. F. W. V. COLLINSON (Preston Royal Infirmary), pointed out that the reception of assistance to conduct venereal clinics or to attend insured or pensioned persons did not affect the voluntary system. He considered that the voluntary system was not affected by payments from those who could afford to pay.

Dr. ASTLEY V. CLARKE (Leicester Royal Infirmary) described the exact position of Leicester, where the voluntary system was keeping the great general hospital of the town solvent because it was being worked with intelligent regard for the nature of the population.

Mr. W. S. DICKIE (North Riding Infirmary) also spoke in favour of the voluntary principle.

Flat opposition was expressed to the motion and to the whole voluntary system by Dr. PETER MACDONALD of York, who found the voluntary system, as founded on charity, to be against the sentiments of the age, and who, moreover, believed it to be impossible that such a system should continue long under existing financial conditions.

Mr. L. P. GAMGEE (Birmingham General Hospital) sought the definition of what was a voluntary hospital in much the same terms as those which Sir Hamilton Ballance employed, while Dr. T. SANSOME (West Bromwich), impressed with the virtues of the voluntary system, thought that the financial arguments were against it.

Mr. BISHOP HARMAN having explained that in his motion he did not contemplate that State contributions affected the voluntary system, the resolution was put to the meeting and carried by some 150 votes to 4.

A second motion, standing in the name of Mr. A. E. MORISON, of the Durham County Hospital, registered the view of the meeting that necessitous persons should continue to be treated free. This was agreed to without dissentients, and the same lucky fate met the motion in Mr. BISHOP HARMAN'S name declaring it undesirable that voluntary hospitals should be subsidised by local rating authorities, "except in so far as payment is made for the examination and care of patients for whom these authorities are responsible."

A fourth motion standing in Mr. BISHOP HARMAN'S name was to the effect that in times of financial difficulty it is desirable that the central Government should subsidise voluntary hospitals, and that such subsidy in the case of any individual hospital should take the form of a contribution proportional to the

income received by the hospital from voluntary and other contributions. The subsidies here proposed should be made through some central hospital fund.

A debate arose here over an amendment, which was subsequently lost, proposed by Dr. R. A. BOLAM, Chairman of the Council of the British Medical Association. Dr. Bolam thought that it would be advisable to specify the objects for which State grants were required, and proposed that these grants should be "for training of medical practitioners and nurses and, by loan, for extension of hospital facilities." The amendment was sympathetically considered by the meeting, but was eventually lost by an almost unanimous vote, the original motion being agreed to.

The conference next registered its view—

That a greatly extended support for voluntary hospitals should be sought from employers and insurance companies, seeing that they benefit largely, both directly and indirectly, by the services of the voluntary hospitals.

Dr. J. R. ROBERTSON (Ashton-under-Lyne Infirmary) then brought forward a motion—

That every in-patient of a voluntary hospital should make a weekly contribution towards the cost of maintenance therein; in the case of insured persons this charge should be met by the Ministry of Health.

The first part of this motion was amended with the qualification, after the word patient, "who is not a necessitous person," and in this form the motion was agreed to.

A motion standing in the name of the Durham County Hospital was brought forward by Mr. A. E. MORISON to the following effect:—

That this conference considers that the contributory method of subscription is the only one possible under the industrial conditions of the North of England. In view, however, of the increased cost of maintenance, &c., it considers that the contributory rates paid by workmen should be materially increased.

This met with approval, as did one proposed by Dr. MURRAY BLIGH (David Lewis Northern Hospital) to the following effect:—

That it is desirable that voluntary hospitals, after securing sufficient accommodation for the necessitous poor, should make arrangements for the reception of patients who are able to pay for the cost of their maintenance and treatment in whole or in part.

A further resolution was moved from the David Lewis Northern Hospital, Liverpool, providing—

That no fixed rate of payment for professional services rendered to such patients should be established, the fees so payable to remain, as at present, a matter of arrangement between patient, family physician, and consultant.

This resolution was carried.

Dr. ASTLEY CLARKE then proposed the following motion:—

That the logical position for the members of the honorary medical staffs of all voluntary hospitals to take up in the event of decisions being taken which would lead to patients paying, in part or in whole, the hospital maintenance fees, either individually or by some contributory method, or with the addition of rate aid or State aid, or by a combination of two or more of these methods, is that a percentage of all such payments should be passed into a fund which can be allocated in any manner which such honorary medical staff may determine.

The motion was founded upon suggestions made by the British Medical Association as to the uses of a staff fund, and met with favour.

In conclusion, the meeting decided that another conference should be summoned, when it seemed necessary to the Hospitals Committee of the British Medical Association.

FROM the beginning of 1921 the annual Fellowship dues of the American Medical Association are raised from $5 to $6, an increase 20 per cent. The subscription carries with it the right to receive the *Journal of the A.M.A.*, the income from which supports the Association's activities in the interest of the medical profession and the public, such as the work of the Council on Pharmacy and Chemistry, of the Chemical Laboratory, of the Council on Medical Education and Hospitals, of the Council on Health and Public Instruction, and of the Biographical and Propaganda departments.

TUBERCULOSIS.

Decline of Tuberculosis in Birmingham.

THE report issued by Dr. G. B. Dixon on tuberculosis in Birmingham strikes a happy mean between the flamboyant note of the pre-war era, when much was written and talked about the conquest of consumption, and the jeremiads on tuberculosis so familiar at the present time. Birmingham achieved in 1919 the lowest tuberculosis death-rate on record, the figures being 1188 deaths from all forms of tuberculosis, equivalent to a mortality-rate of 1·28 per 1000. The number of notifications was 3116—the lowest since notification was introduced. Thus there is good reason for Dr. Dixon's claim: "We are now getting fewer deaths than before the war, and we are getting far fewer new cases." Dr. Dixon carefully avoids the tempting claim that the decline of tuberculosis is mainly due to direct anti-tuberculosis measures; it is, no doubt, due to many factors, several of which are still more or less obscure. But it is evident from his report that the campaign against tuberculosis in Birmingham is whole-hearted and multi-tentacular. It is particularly encouraging to note in his short essay on sanatorium treatment that, at the Yardley Road Sanatorium, the bad old custom of loafing is becoming a lost art, and the pernicious system of monotonous, unremunerated work, masquerading as "graduated, therapeutic labour" is giving place to interesting employment of a productive nature and with an educational value.

Classification of Pulmonary Tuberculosis.

In one of the appendices to Dr. Dixon's report Dr. E. G. Glover, medical superintendent of Salterly Grange Sanatorium, gives some useful hints as to classification of tuberculosis, a subject which has been discussed in papers by Dr. Niven Robertson and Dr. W. B. Knobel in the December number of *Tubercle*. Dr. Glover exposes the frailties of the purely anatomical classification in one illuminating adjective. It is *sartorial*. The classification which he prefers puts sputum negative cases in Group I., the case which changes from sputum positive to sputum negative under primary treatment in Group II., and the case which remains sputum positive during treatment in Group III. His is a good working rule, with purely objective criteria easily rubricised. As the researches of Dr. N. D. Bardswell and many others have shown, the factors on which this classification is founded are of far-reaching prognostic significance. Yet this classification still ignores the three most important influences determining the patient's fate—balance of mind, a balance at the bank, and the sympathy of relatives and employers. The second of these can, of course, be rubricised, but the first and the last are difficult to gauge and tabulate.

The Danger of Tuberculous Milk.

Dr. James C. Gilchrist, honorary secretary of the King Edward VII. Welsh National Memorial Association for the Prevention, Treatment, and Abolition of Tuberculosis, has sent us for publication a resolution passed after discussion by a group of 16 tuberculosis officers and institution superintendents under the Association:—

That this conference of the medical staff of the Welsh National Memorial Association unanimously affirm as their view that the distribution of milk containing tubercle bacilli is fraught with danger to the lives and health of children consuming it, and that the hypothesis that tubercle bacilli consumed in milk may produce a degree of immunisation is no reason for the abatement of any efforts directed towards producing a tubercle free milk.

A statement drawn up by a prominent U.S. official on the tuberculin test as a factor in the milk traffic has been issued to the press by Mr. Emile Berliner, President of the Washington Tuberculosis Association, and (incidentally) inventor of the gramophone. The tuberculin test as a means for insuring a safe and sanitary milk-supply is described in this statement as wholly inadequate.

A herd may be tested to-day and no reacting animals be found, and again tested in six months, when one or several animals may be discovered with tuberculosis. It is entirely possible that within a month from the first test the milk

from that herd may contain living, active, virulent tubercle bacilli. And such milk, if consumed in the raw state, in particular by children, may give them tuberculosis, notably of the intestines, of the spine, and of the glands. Butter made from the raw cream of such milk would likewise contain the bacilli in an active and virulent state for at least four to five months. It is comparatively easy to "dope" a herd with certain easily obtainable chemicals and thereby prevent the tuberculin from acting in a test, even though animals in the herd are afflicted with open tuberculosis.

The conclusion is drawn that only proper pasteurisation under official supervision and direction will give to a community a safe milk- and cream-supply.

The Auto-Urine and Serum Tests for Active Tuberculosis.

The reaction which Professor Wildbolz, of Berne,[1] described last year promises to supply a much-needed test for active tuberculosis in an early stage of the disease. It is a safe prophecy that his auto-urine reaction and the auto-serum reaction more recently reported on by his assistant, Dr. Imhof,[2] will figure prominently in the medical journals for some years to come. In passing it may be noted that the principle of auto-sero-diagnosis is not new, and even before the war its possibilities were being discussed. Wildbolz assumes, and gives numerous arguments in support of his assumption, that in active tuberculosis antigens are excreted by the urine and can be demonstrated by intracutaneous inoculation of the producer of the urine or any other tuberculous patient. When a tuberculous lesion is latent no antigens are demonstrable in the urine, and the test is therefore, according to Wildbolz, superior to v. Pirquet's, which indicates infection without clearly distinguishing between latent infection and active disease. It was found that urine had to be condensed by evaporation in vacuo before its antigen content was sufficiently concentrated to provoke an intracutaneous reaction. A negative reaction was obtained when healthy urine was injected into the skin of healthy persons or when the tuberculous were inoculated with the urine of healthy persons. The urine of the tuberculous also failed to give a positive reaction in healthy persons whereas it was nearly always positive when the urine's producer or anyone else gave a positive reaction to a 1 in 1000 solution of tuberculin. There was never a general or focal reaction, only a local reaction. V. Pirquet's and Wildbolz's reactions were strikingly parallel and confirmatory of each other. Dr. Imhof's paper is chiefly concerned with the auto-serum test which he has carried out with blood deproteinised by precipitation with alcohol. He points out that there are various drawbacks to the auto-urine reaction, which is more painful, more apt to provoke necrosis of the skin, and more subject to error on account of variations in the concentration and other properties of the urine than the auto-serum test. In bi-lateral renal tuberculosis, for example, the auto-urine reaction may be negative. Imhof's comparison of the auto-serum with the auto-urine reaction in more than 80 cases showed a close conformity between the two. In 30 cases of surgical tuberculosis both reactions were positive with only one exception. In another group of 34 cases admitted to hospital for accidents or non-tuberculous diseases, both reactions were invariably negative. But perhaps the most instructive of all his cases were those in which the two auto-reactions were at variance with the clinical diagnosis. Among these were nine patients admitted to hospital for accidents or non-tuberculous diseases. All gave a positive reaction to both tests, although there was at the time no clinical evidence of tuberculosis. These cases were, however, watched and no fewer than five subsequently developed signs of pulmonary disease.

Only a few papers have hitherto dealt with control investigations of the claims of the Berne school. Miche[3] does not accept all of them, but Lanz[4] has carried out important investigations, which are confirmatory and which show how various errors may be eliminated. Much of his work concerns the treatment of the urine with a view to removing its most irritating, non-specific elements which obscure the intracutaneous reaction. Gramén,[5] working at the St. Göran's Hospital in Stockholm, seems greatly impressed by the value of the reaction which he has tested in about 50 cases. Obviously it is too early to form a correct opinion of the importance of these reactions, but if the claims already made on their behalf are justified, an advance of very great importance has been made in the early diagnosis of active tuberculosis. The principle concerned may also possibly be extended to the early diagnosis of tuberculosis in cattle, for, as Wildbolz has intimated, tuberculous antigens in the milk of a cow may, perhaps, be demonstrable by an ophthalmo-reaction in the same animal.

[1] Corr.-Bl. für Schweiz. Aerzte, Nr. 22, 1919.
[2] Schweiz. med. Woch., Nr. 46, 1920.
[3] Rev. méd. de la Suisse Romande, Nr. 12, 1919.
[4] Schweiz. med. Woch., Nr. 17, 1920.

A University Sanatorium.

On Dec. 16th Dr. Louis Vauthier recounted before the Geneva Medical Society the story of his scheme for the relief of students stricken with phthisis in the midst of their course of study. During many years at Leysin Dr. Vauthier has been sadly impressed by the large number of patients of this class who come for treatment and by the particularly unfortunate position in which they find themselves. To many the abandonment of their professional studies at a late stage spells the ruin of a career. In all cases the extra anxiety resulting from uncertainty as to their future life's work constitutes a serious moral obstacle to successful therapy. Dr. Vauthier therefore conceived the idea of establishing a university sanatorium where study might be pursued concurrently with a well-ordered course of treatment. His proposals were very warmly received by the senates of the three universities in Romance Switzerland—those of Geneva, Neufchatel, and Lausanne. In July, 1919, representatives of these universities met and constituted a committee of action. The universities of German Switzerland were appealed to and promised their support. In March, 1920, the project was placed before the governing body of the League of Red Cross Societies and received its blessing. Later it was taken up with enthusiasm by the World's Student Christian Federation, the students of Belgium, Holland, France, Spain, and Roumania being particularly active. At the present time a booklet is being prepared which will give a history of the scheme, an outline of the organisation of the proposed institution, and an appeal for the coöperation of foreign universities. The University hopes to draw its students from each of the 31 member nations adhering to the League of Red Cross Societies.

MEDICINE AND THE LAW.

A Medical Witness and Punctuality.

AT a recent inquest in North Leicestershire, at which there were only two witnesses, the mother of a child killed through the upsetting of a pot full of scalding tea, and a medical practitioner, the latter arrived late. On his entering the court the coroner is reported as having said to him: "I don't know whether you are used to inquests, but in my district punctuality must be insisted on." To this the medical man replied that it was difficult for him to leave people who were dying, and that he had been called to another place to attend a patient who had to be sent to a hospital. The coroner was not satisfied and a further discussion took place, the witness protesting that he meant no disrespect, but that a dying man claimed his aid, and the coroner insisting that all witnesses, medical and otherwise, must be punctual at inquests. Finally the coroner said that he did not desire for a moment to impute or suggest intentional discourtesy, but that when a medical man could not get to an inquest in time he should find means of letting him or his officers know. He would then be prepared to hold things over. This probably is the best solution that can be arrived at in circumstances which fortunately do not often occur. None can deny that the coroner is entitled to all respect and to the punctual arrival of witnesses. He could not get through his work otherwise, and in modern times, with telephonic and telegraphic communication, fairly prompt notice of

[5] Hygiea, Nov. 16th, 1920.

necessary absence or delay can usually be given. There must, however, sometimes, if rarely, be occasions when the choice will lie between keeping the court waiting and leaving a dying person unattended, and when there is no time or when there are no means for informing the coroner or possibly a bench of magistrates. Such a thing might even happen conceivably when a judge was expecting the witness at a court of assize, although then, as a rule, a medical man would have made arrangements with a colleague to attend his patients in cases of urgency. What should be done in such an emergency? There can, it is submitted, hardly be any question that the medical man's duty is to concern himself with the saving of life if he has reasonable cause to believe that life will be imperilled by his not responding to the call for his assistance. He will then have to trust to the courtesy and humanity of the court before which he should have attended, and should go there to make his excuse with the least possible delay. Stress, however, is laid upon the necessity for practical certainty as to the urgency of the need for immediate medical aid, and in the case of a witness bound over to appear in an assize court it is strongly recommended that he should in all cases take steps to render the imagined dilemma impossible.

An Inquest on a Case of Anthrax.

On Dec. 20th an inquest was held at Southwark before Dr. F. J. Waldo, sitting with a jury, upon the body of Frederick Griffiths, aged 59, a leather dresser at the Abbey-street factory, Bermondsey, of Messrs. Bevington and Sons, leather merchants. According to the evidence, deceased had worked during the past two years in a wet department, breaking, unhairing, and flushing goat skins from the infected area of the Cape and East India. Previous to this process the skins were washed in water by other workers. Deceased was last at his work on Friday, Dec. 10th; on the following day he complained of a small boil on his neck, and later the neck became swollen. On the 12th, in the absence of his panel doctor, another practitioner painted the swelling with iodine and prescribed ointment. On the 13th his panel doctor advised his removal to Guy's Hospital, where anthrax was diagnosed. He was there treated with Professor Sclavo's serum and, at the same time, the malignant pustules were excised. A second dose of serum was injected on Dec. 14th; the patient died next day. A foreman fellow-worker said deceased, a healthy vigorous man, had not complained of any illness at all. Basins, cold water, soap, nailbrushes, and towels were provided for the workers. Coloured pictures showing the various stages of local anthrax, with printed directions, were hung up at the factory. He himself had noticed the pictures, but had never read the directions as to the showing of suspicious cases to a doctor. He only knew of two previous cases of anthrax at Messrs. Bevington's, one in February, 1919, and one in August, 1920. Both cases recovered under the serum treatment at Guy's Hospital. Dr. Thomas Rose, divisional surgeon to the police, had made a post-mortem examination of the body and said he found no petechiæ, but a film from the spleen showed numerous characteristic, undoubted bacilli and spores of anthrax. A culture from the subcutaneous tissue and lungs gave growths of the same bacillus. Death was due to heart failure from toxæmia induced by œdema of malignant anthrax. The condition was consistent with infection by means of a nail from Cape goat skins. Disinfection was impracticable since the skins would be destroyed by the process. Dr. Waldo, in summing up, said most cases of anthrax in London occurred in Bermondsey, the centre of the leather and tanning trade. Cleanliness was the best preventive of anthrax and hot water ought at once to be provided in addition to cold at Messrs. Bevington's factory. Workmen should notify the foreman immediately the slightest suspicion of anthrax arose, so that serum might at once be injected by a doctor. Too little thought was given to this disease by workers in skins. Trial of the serum should be made in every case. A verdict of misadventure was recorded, the cause of death being anthrax.

PARIS.

(FROM OUR OWN CORRESPONDENT.)

Plague Prevention in France.

A FEW isolated cases of bubonic plague have been recorded in France fairly recently. The disease is diagnosed "Malady No. 9" on the notification forms to the police authorities, according to the French Medical Acts, Feb. 10th, 1903, and Sept. 28th, 1916, and it is that fact which aroused curiosity in the French press some time ago. It was suggested that some unknown exotic disease had been introduced in the country by refugees, and had provisionally been called "Malady No. 9." The appearance of the disease was immediately followed by prophylactic measures, consisting in an active campaign of rat destruction. In order to stimulate the general interest a reward of 25 centimes was given for the body of each dead rat. People who were taking an active part in the destruction of rats complained that during this time fleas were becoming more numerous in their homes. This complaint led to the appreciation of the special danger of contamination by fleas during a campaign for rat destruction unless adequate precautions are taken, for dead rats have to be carried about to be checked by the local authorities who give the rewards. These considerations have dictated more elaborate prophylactic measures, which appear in the general instructions issued this week to practitioners by the Ministry of Health. Doctors are asked to point out the danger of handling dead rats on account of their fleas, and are requested to recommend that paraffin or benzene should be poured over dead rats, which should be burnt or properly buried. Amongst other recommendations are the bacteriological examination of the serous effusion or pus contained in glands in order to try to identify Yersin's bacillus in suspicious cases, and the isolation of diagnosed cases and suspicious patients, and their immediate notification to the local authorities. Practitioners are also advised to inject intravenously 100 to 120 c.cm. of the antiplague serum made at the Pasteur Institute, as soon as the disease is diagnosed. It is also suggested that 60 to 80 c.cm. of serum should be injected daily during the next three days. Doctors are furthermore asked to do their best to convince those approaching their patients (nurses, relatives, &c.) of the necessity of being vaccinated. It is specified that vaccination for an adult should consist in a 2 c.cm. subcutaneous injection of the antiplague vaccine made at the Pasteur Institute (½ c.cm. for an infant, 1 c.cm. for a child between 2 and 10). The study of the recent cases of bubonic plague has led to new researches dealing with the bacteriological diagnosis of the disease. Mons. H. Violle, in a communication to the Société de Biologie on the diagnosis of bubonic plague, recommends that when direct examination of serous effusion or pus from a gland has not revealed Yersin's bacillus, a serodiagnosis should be made not with the blood serum but with fluid or even pus obtained by puncture of a gland. Mons. Violle has observed that with this technique the agglutination can become positive very soon after the onset of the disease. He remarks that this fact is well worth considering since antibodies appear only much later in the blood.

Encephalitis Lethargica and Hiccup.

In a recent article in the *Presse Médicale* Mons. J. Lhermitte refers to cases of persistent hiccup with nasal and bronchial catarrh, malaise, and slight fever, which have recently occurred in France and elsewhere in Europe. Other cases have occurred concurrently with an epidemic of encephalitis lethargica and since the usual symptoms of this latter disease have in some cases been preceded by persistent hiccup with nasal and bronchial catarrh, malaise, and slight fever, he concludes that the syndrome represents a disease of a similar nature. This opinion has already been expressed at the Société Médicale des Hôpitaux by MM. Netter, W. Dufour, and R. Bénard, and lately at the Société de Neurologie by MM. J. Sicard and J. Paraf.

Dec. 26th, 1920.

IRELAND.

(FROM OUR OWN CORRESPONDENTS.)

Prize-giving at the Royal College of Surgeons in Ireland.

THE annual distribution of prizes in the school of the Royal College of Surgeons in Ireland took place on Dec. 18th, when an address to the students was delivered by the Vice-President, Sir W. I. de C. Wheeler, in the absence, due to illness, of the President. The Vice-President contrasted the present conditions of medical study with those found when he was a student. At that time the operating theatre still savoured of the bull-ring, and anæsthesia was in its infancy. The physician's top hat and double-breasted coat had now disappeared, and the possession of a pure water-supply had done more for the cause of temperance than a thousand Pussyfoot campaigns. The College, the only unendowed school of medicine in Ireland, had strong claims for State aid, which had not yet been met. On the medical side of practice the belief in drugs still held too much sway, while surgery was as yet saturated with reaction and conservatism. He advised his hearers to keep their minds open and independent. They should work with each other as comrades, not as competitors.

Resignation of Professor Hugh A. Auchinleck.

Professor H. A. Auchinleck, who has been professor of medical jurisprudence in the school of the Royal College of Surgeons for more than a generation, has now resigned that post and retired from practice. The students of the school entertained him to dinner last week prior to his leaving Dublin for a visit to East Africa. The Vice-President occupied the chair and several of his colleagues were also the guests of the students.

The Use of the Red Cross by Doctors.

Sir John Lumsden, chairman of the Joint Committee in Ireland of the St. John Ambulance Association and the British Red Cross Society, has, with the consent of his London headquarters, advised medical practitioners in Ireland to affix a Red Cross badge in a prominent position on their motor-cars so as to be visible by day or night, in order to protect from shooting should the occupant fail to hear a challenge.

Death of Dr. George Peacocke.

The death of Dr. George Peacocke, of Dublin, occurred on Christmas morning after a few days' illness. He was struck down by pneumonia very suddenly, and few of his friends had heard of his illness until the news of his death became public. Dr. Peacocke was still a young man, not much over 50, and was always of robust health. He was educated in Trinity College, Dublin, taking his medical degrees in 1892. His whole professional career was associated with the Adelaide Hospital, where he was successively house physician, assistant physician, and physician. He took much interest in the affairs of the Royal College of Physicians, and held for a time the offices of censor and vice-president. He was, since its foundation, chairman of the Irish branch of the College of Nursing, Ltd. He had also been president of the Section of Medicine of the Royal Academy of Medicine in Ireland, and contributed frequently to its Transactions and to the medical journals. As a capable and thoughtful physician and an upright man he was held in much respect in Dublin, and will be greatly missed by his professional brethren.

Ulster Medical Society.

Dr. Thomas Houston, the president of the Society, and Miss Houston gave an "At Home" to members and their friends, at the Medical Institute, Belfast, on the evening of Dec. 18th, 1920, when Major J. A. Sinton, V.C., was presented with the certificate of Honorary Fellowship of the Society. The certificate is in the form of a tryptich bound in Russia leather and is ornamented by water-colour drawings of Queen's University, the Royal Victoria Hospital, and the Medical Institute, with reproductions of the Victoria Cross and the Russian Order of St. George, and the crests of the Indian Medical Service and the Ulster Medical Society. It reads as follows:—

"This is to certify that John Alexander Sinton, V.C., M.D., D.P.H., Indian Medical Service, has been elected an Honorary Fellow of the Ulster Medical Society in appreciation of the conspicuous gallantry and devotion to duty which have earned for him the greatest distinction which a British soldier can obtain—the Victoria Cross for Valour."

Dec. 28th.

URBAN VITAL STATISTICS.

(Week ended Dec. 18th, 1920.)

English and Welsh Towns.—In the 96 English and Welsh towns, with an aggregate civil population estimated at nearly 18 million persons, the annual rate of mortality, which had been 13·5, 13·2, and 12·9 in the three preceding weeks, rose to 15·3 per 1000. In London, with a population of nearly 4½ million persons, the death-rate was 16·0, or 3·1 per 1000 above that recorded in the previous week, while among the remaining towns the rates ranged from 7·1 in Ealing, 7·2 in Gillingham, and 7·4 in Walthamstow, to 21·4 in Bath, 21·6 in Tynemouth, and 21·8 in Merthyr Tydfil. The principal epidemic diseases caused 247 deaths, which corresponded to an annual rate of 0·7 per 1000, and comprised 93 from infantile diarrhœa, 76 from diphtheria, 33 from measles, 26 from whooping-cough, 16 from scarlet fever, and 3 from enteric fever. Measles caused a death-rate of 1·2 in Sheffield and in Middlesbrough, 1·4 in Smethwick and in Barrow-in-Furness, and 1·7 in Walsall. There were 4994 cases of scarlet fever and 2654 of diphtheria under treatment in the Metropolitan Asylums Hospitals and the London Fever Hospital, against 5297 and 2654 respectively at the end of the previous week. The causes of 40 of the 5217 deaths in the 96 towns were uncertified, of which 10 were registered in Birmingham, 5 in London, and 3 each in Liverpool and Rhondda.

Scottish Towns.—In the 16 largest Scottish towns, with an aggregate population estimated at nearly 2½ million persons, the annual rate of mortality, which had been 14·3, 13·5, and 15·2 in the three preceding weeks, rose to 16·1 per 1000. The 363 deaths in Glasgow corresponded to an annual rate of 17·0 per 1000, and included 7 from infantile diarrhœa, and 5 each from whooping-cough and diphtheria. The 92 deaths in Edinburgh were equal to a rate of 14·1 per 1000, and included 2 from infantile diarrhœa and 1 from diphtheria.

Irish Towns.—The 161 deaths in Dublin corresponded to an annual rate of 20·2, or 2·1 per 1000 above that recorded in the previous week, and included 7 from infantile diarrhœa, 4 from whooping-cough, and 1 each from scarlet fever and diphtheria. The 126 deaths in Belfast were equal to a rate of 15·9 per 1000, and included 2 each from scarlet fever and infantile diarrhœa, and 1 from diphtheria.

The Services.

ARMY MEDICAL SERVICE.

Temp. Major-Gen. Sir R. Jones, (Major, R.A.M.C., T.F.) relinquishes his temporary commission.

ROYAL ARMY MEDICAL CORPS.

B. Fitz-J. Haythornthwaite to be temporary Lieutenant.

Officers relinquishing their commissions: Temp. Lieut.-Col. W. J. N. Vincent, on ceasing to be employed at the Wharncliffe War Hospital (retains the rank of Lieutenant-Colonel). Temp. Major J. Dalrymple (granted the rank of Lieutenant-Colonel). Temp. Capt. A. G. Welsford (granted the rank of Major).

SPECIAL RESERVE OF OFFICERS.

Capt. E. S. Mawe relinquishes his commission on account of ill-health contracted on active service and retains the rank of Captain.

TERRITORIAL FORCE.

Capt. C. E. K. Herapath to be Major.

Temp. Major W. A. Smith (4th Bn., East Lancs. Regt. relinquishes his temporary commission.

Capts. A. C. Court (late R.A.M.C., S.R.) and A. G. M. Middleton (late R.A.M.C.) to be Captains.

Supernumerary for service with O.T.C.:—Lieut. D. R. Wheeler (late R.A.M.C.) to be Lieutenant for service with Belfast University Contingent, Senior Division, Officers Training Corps. London University Contingent: Capt. J. H. Ryffel resigns his commission and retains the rank of Captain.

INDIAN MEDICAL SERVICE.

Lieut.-Col. R. Steen is transferred to the temporary non-effective list.

The King has approved the admission of the undermentioned to the I.M.S.:—To be Captains: Major W. J. Webster (late R.A.M.C., S.R.); Capt. G. M. Moffatt (late 3rd Bn., R. Dub. Fus., S.R.); Capt. J. M. Mitchell (late R.A.M.C.).

THE HORSLEY MEMORIAL.

THE executive committee of the Horsley Memorial has now published the first list of subscriptions towards the foundation of a lectureship or scholarship in order to commemorate the services of the late Sir Victor Horsley to science and to the Empire. The absence of numbers of medical men on war service prevented the taking of steps in this matter until a short while ago, but the memory of Sir Victor Horsley's tragic death in Mesopotamia is still fresh, and will be brought back acutely to all minds by the announcement of the death on Christmas Day of his elder and only surviving son. It is certainly not too late to move for the recognition in a permanent form of Horsley's life and work. It is suggested that the most appropriate trustees would be the Senate of the University of London, and that if a lectureship be finally decided upon the subject should be left widely open, in order to secure the services of men distinguished in various departments of public life to deliver the yearly Victor Horsley Lecture.

Sir Victor Horsley was one of the most noteworthy students of University College Hospital, a distinguished medallist and graduate of the University of London, a leader and first chairman of the Representative Meeting of the British Medical Association, and a Fellow of the Royal Society. His pioneer research work connected with surgery of the brain and nervous system and the causation of myxœdema, and his investigations as secretary of the commission appointed to inquire into the value of Pasteur's treatment of rabies, were amongst his great achievements; but his distinction in science and surgery was the result of only a part of his labours. He was possessed of a great desire for the improvement of the social conditions of his country, and so found himself a leader of various more or less unpopular causes, which he upheld with a fervour not always devoid of offence to his opponents; his devotion to reforms connected with temperance, to the enfranchisement of women, the welfare of children, and the abolition of slums, will long be remembered; and he has left behind him the memory of a brilliant and painstaking teacher and a great and honourable public servant.

The first list of subscriptions, paid and promised, is as follows:—

	£	s.	d.
Sir Frederick Mott, K.B.E., and Lady Mott, Dr. Camac Wilkinson, Sir George Newman, K.C.B., Dr. J. O. Wakelin Barratt, Dr. and Mrs. George Murray ... each	10	10	0
Rt. Hon. Lord Edmond Fitzmaurice, Sir Felix Semon, K.C.V.O., Dr. Mary Sturge, Dr. Slinger, C. J. Bond, C.M.G., Dr. Farquhar Buzzard, Right Hon. Leif Jones, Percy Sargent, C.M.G., D.S.O. ... ... each	10	0	0
Sir W. Arbuthnot Lane, Bart., Sir G. Sims Woodhead, K.B.E., N. Bishop Harman, Dr. H. H. Tooth, C.B., C.M.G., Dr. Otto May, Dr. A. Salusbury McNalty, Ewen J. Maclean, Edward J. Domville, O.B.E., S. H. Burton, J. Smith Whitaker, Sir John Bland-Sutton, Dr. Blacker, C.B.E., Lieut.-Col. R. McCarrison, Mrs. McCarrison, H. Huxley, Raymond Johnson, O.B.E., Dr. Gordon Holmes, C.M.G., C.B.E., Sir Hamilton Ballance, K.B.E., C.B., Dr. W. H. Willcox, C.B., C.M.G., Society of Members of the Royal College of Surgeons, Professor E. H. Starling, F.R.S.... ... ... each	5	5	0
Right Hon. Sir T. Clifford Allbutt, K.C.B., Sir Charles Ballance, K.C.M.G., Dr. A. Fulton, Sir J. Rose Bradford, K.C.M.G., C.B., C.B.E., Right Hon. T. R. Ferens, Dr. Frank Hinds, W. G. Spencer, O.B.E.... ... ... each	5	0	0
Mr. and Mrs. Stephen Paget, Sir Rickman J. Godlee, Bart., K.C.V.O. ... ... each	3	3	0
Dr. R. A. Bolam, O.B.E., Dr. T. Ridley Bailey, Sir T. Jenner Verrall, LL.D., Dr. Dawson Williams, Dr. R. H. Clarke, Dr. Percy Rose, Dr. Steen, Dr. Lauriston Shaw, Dr. E. W. Goodall, O.B.E., Dr. Alfred Cox, O.B.E., Dr. Rigden, Lady Barrett, C.B.E., Col. Sir A. W. Mayo-Robson, K.B.E., C.B., C.V.O., Sir Leonard Rogers, C.I.E., Sir Hugh Beevor, Dr. Squire Sprigge ... ... each	2	2	0
Dr. C. E. S. Flemming, Dr. Garstang, Dr. Hawthorne, Sir Charles Harrison, Dr. O'Sullivan, Dr. Henry Sturge, Col. Mansell Moullin, C.B.E., Professor Rutherford Morison, Dr. Eleanor Lowry, Dr. Russell Wells, Anonymous ... ... each	1	1	0
Miss Powning, Dr. Henry Bird, Dr. J. J. Muskens... each	1	0	0

The hon. treasurers of the Memorial are Sir Frederick Mott, K.B.E., F.R.S., 25, Nottingham-place, W.1, and Dr. H. H. Tooth, C.B., C.M.G., 34, Harley-street, W.1; the hon. secretaries are Sir W. Arbuthnot Lane, Bart., 21, Cavendish-square, W.1, and Edward J. Domville, Esq., C.B.E., Symondsbury, Bridport. Subscriptions may be paid to either of the above-named, or to the "Victor Horsley Memorial Account," London County Westminster and Parr's Bank, Hanover-square Branch.

Correspondence.

"Audi alteram partem."

THE FUTURE OF POOR-LAW INFIRMARIES.

To the Editor of THE LANCET.

SIR,—The statements made by different eminent speakers at a meeting of the Harveian Society, of which you give a full account in your issue of Dec. 25th, are such as to cause just indignation among all connected professionally with Poor-law hospitals or infirmaries. They make one wonder also whether the speakers do in fact know anything about the ordinary modern Poor-law hospital. We learn that "sick people have been provided in the past with little else than food and shelter"; and the speaker is not, from the context, referring to at all a remote past. We are told that there is no provision for obtaining Wassermann tests, bismuth X ray pictures, blood cultures or counts, or X ray examinations for tubercle. It is suggested kindly that one general practitioner may be equal to three "medical State officials," which in this connexion can only mean the resident medical staff of the infirmaries; this to men who see daily the disastrous effects of delay and inadequate treatment at home and at out-patient departments. It appears that our general equipment is poor and our laboratory equipment nil, and that we treat only incurable and chronic cases. These are some of the statements, in their own words, of speakers who contemplate absorbing the Poor-law hospitals into the voluntary system.

Now no thoughtful man in a position to judge can deny, or wishes to deny, that great changes and improvements are necessary in Poor-law hospitals both for present purposes and if they are to take on a larger section of the public as their patients. And no medical superintendent who has borne for years the burden of responsibility for clinical and administrative work together can fail to see that, whatever be the effect on his own position, a wide expansion of medical staff must result from the new conditions. Already there are few infirmaries which have not specialists attached, either visiting regularly or available when desired, and this is an arrangement advocated for many years by the Medical Superintendents' Society and due entirely to the initiative of individual superintendents. And unquestionably if these hospitals, under the name of municipal hospitals or otherwise, are to be used by the main body of middle- and working-class patients, public opinion will legitimately demand that they shall have a numerous professional staff of the highest possible qualifications. For though specialism is possibly somewhat overdone and a smaller number of patients than is generally supposed suffer through lack of "specialist" advice, nevertheless it is wrong that any risk should be run of even a small number of patients so suffering. That there is this risk at present cannot be denied.

But, Sir, in what spirit is this "linking-up" process to be approached? Is is to be mere swallowing up by the voluntary system, itself by no means free from reproach? Or is it to be a genuine and reciprocal coöperation? Or is it to be avowed rivalry—pull voluntary, pull municipal, and the devil take the hindmost? And is it certain that in 20 years time the municipal hospital would be that hindmost? If those responsible for the policy of the voluntary hospitals begin by throwing out grotesque mis-statements of this sort, how do they expect to be welcomed? We do not pretend to be other than we are. We are not teaching schools and cannot pretend to the skill or repute of the acknowledged leaders of the profession, the picked men, to be found in them. But such as we are we have fought our fight for improvement year after year, with no help from the voluntary hospitals as such, though with generous help often from individuals. The charge cannot with justice be brought against the Poor-law hospitals that they have failed to treat adequately the patients with whom they have had to deal. As the class of patient has altered so

gradually the equipment, methods, and staff have expanded, and these hospitals have cured enormous numbers of patients whom the voluntary hospitals have either rejected entirely, or have been obliged, through pressure on their beds, to discharge after quite inadequate periods of treatment.

And now at last the prospect of a great future opens before our Poor-law hospitals. Now, too, the voluntary hospitals begin to take notice of us and to desire to link our future with theirs. But if the attitude of the speakers at the Harveian Society is representative, it may incline us to seek that future independently rather than "link up" with those who regard us as backwaters of stagnancy and neglect. It does not seem by any means certain as yet that the future municipal hospital, if that is to be its name, will be part of the voluntary system. In some ways the tendency seems otherwise. This may be regrettable, but our regret would be a good deal lessened by such statements or mis-statements as these, which, it is well to say plainly, are simply untrue.

Although I feel this protest to be necessary one would rather look at and welcome the manifest desire of every speaker that every available hospital should be put on the highest possible footing. Here we are all on common ground.

One aspect of the matter is too often overlooked. What is to become of the very poor patient and the patient suffering from unattractive disease of a septic nature and the wasting babies rejected by the children's hospitals. At present they "squall" near the "grave case" of one speaker—or perhaps they do not always. At any rate the very poor and those whose illnesses are unattractive, no good for teaching, not creditable to the surgeon, have been squeezed out of the voluntary hospitals, and bid fair to be squeezed out of the Poor-law hospitals too. They will still need treatment, however, and unless that is grasped there is a danger of much hardship resulting. No doubt there are some unused Poor-law infirmary beds, but the number is nothing like so great as has been represented, and the needs of this class should be recognised as well as the needs, urgent indeed as all admit, of those a little above them in the social scale or more obviously and rapidly curable.—I am, Sir, yours faithfully,

J. C. MUIR,
Medical Superintendent of the Whipps Cross Hospital of the West Ham Board of Guardians.

Dec. 27th, 1920.

CRIMINOLOGY.

To the Editor of THE LANCET.

SIR,—The leading article in your issue of Dec. 25th (p. 1314) on the treatment of criminals incites me to suggest what has been for some time in my mind, that some one or more of the bodies who grant a D.P.H. might allow criminology as one of the subjects in its course. I confess that I am thinking of Birmingham, where unusual facilities exist, and teachers who have made it a special study could be found. It might perhaps become a nursery for medical men who wished to enter the prison service.—I am, Sir, yours faithfully,

Dec. 28th, 1920. W. P. HERRINGHAM.

SYNOPSIS OF PHYSIOLOGY.

To the Editor of THE LANCET.

SIR,—In the notice of my book which appears in THE LANCET of Dec. 25th (p. 1311) your reviewer takes exception to the following remark of mine: "Hunger pains ..... are due, as Cannon has shown, to periodic contractions of the stomach wall." He implies that I am incorrect in attributing this discovery to Cannon and that it should properly belong to Carlson. The facts are these: Cannon made the suggestion in a communication to the Boston Society of Medical Science on Jan. 17th, 1911.[1] In collaboration with Washburn he proved it by direct experiment, an account of which appears in the *American Journal of Physiology*, vol. xxix., p. 436, under date March 1st, 1912. The first paper by Carlson on the subject appeared on Dec. 2nd, 1912. Carlson, referring to his own experiments, wrote: "The individual contractions of the group rhythm and the stronger contractions of the continuous rhythm are recognised as hunger pains (confirmation of Cannon and Washburn)."[2] And later, on Jan. 1st, 1913, he wrote: "We owe the actual demonstration of the synchrony of the hunger sensations with the strong contractions of the empty stomach to Cannon and Washburn."[3] Carlson therefore, on his own admission, did but confirm the discovery.

Your reviewer further says: "The central nervous system and reflex action together take up only 16 pages." He makes no mention of the fact that in my book I have arranged the nervous system on a new plan in such a manner that the description of the special senses is woven into the description of the central nervous system. The central nervous system is described in its different aspects on pp. 264–280, 285, 286, 298, 299, 306, 307, 309–317, 321–326. This makes about 35 pages, not 16 as your reviewer states.

I am, Sir, yours faithfully,
FRANGCON ROBERTS, M.D., M.R.C.P.
Clare College, Cambridge, Dec. 27th, 1920.

[1] See Cannon, The Mechanical Factors of Digestion, 1911, p. 204.

THE ORGANISATION OF THE MEDICAL PROFESSION.

To the Editor of THE LANCET.

SIR,—Will you allow me to draw attention to the present position in the organisation of medicine? Excluding for the moment the Royal Colleges, there are three organisations in the medical profession interested in what may be called, for want of a better term, medical politics, namely:—

The British Medical Association, an organisation of individual medical men with a membership of some 20,000 (including those resident in the colonies and abroad), or roughly 52 per cent. of registered practitioners.

The Federation of Medical and Allied Societies, an organisation of societies at present uniting rather more than 18,000 medical practitioners in Great Britain, and some 90,000 of those in the allied dental, pharmaceutical, nursing, and midwives professions.

The Medico-Political Union, an organisation of individual medical practitioners on trade-union lines with a membership of some 3200.

The first and third of these exist to further the interests of doctors alone. The Federation exists to advance the interests of the general public by providing the means of sounding the collective opinion of the various sections in the medical profession, in the allied professions, and in the community at large. As such it neither aspires to leadership nor to control of its constituent bodies.

The view of the Minister of Health may be drawn from his recent statements. On Nov. 1st, 1920, he told a deputation of the B.M.A. that "he was not going to consult half a dozen different bodies each claiming to represent the profession." He also said, "if you want us to consult you, get busy, and set up some machinery whereby you can readily be consulted." He pointed out that "in each area there might be a branch of the B.M.A., but there were also other associations and societies as well." On Dec. 9th, 1920, Dr. Addison received a deputation from the Medico-Political Union, and took the opportunity to make the following remarks:—

"Since the early days of the Ministry of Health there have been a large number of Deputations of medical men on important subjects which the department has under consideration. In such circumstances the voice of a united medical profession, speaking not of its own interests primarily, is most urgently required, but has not yet been obtained. There is no lack of those who say they represent the profession as a whole, but there is no one body which even claims to represent all interested organisations, though some aspire to. If you wish to procure attention for your views you must agree together first. In no other way is it possible for your views to be completely represented in the councils of those concerned with the reconstruction of our public health system."

The view of the British Medical Association may be gathered from the words of the Medical Secretary and

[2] See American Journal of Physiology, vol. xxxi., p. 151.
[3] Ibid., p. 175.

others speaking presumably for the whole body. I may quote the following: "the Association is recognised as the mouthpiece of the profession"; "there is only one organisation in the medical profession—namely, the Association"; "the Association could, if loyally supported by the whole profession, do all that the Federation aims at doing." On Dec. 15th, 1920, the Central Council of the Association rejected the recommendation of the Ministry of Health Subcommittee, which body advised coöperation with the Federation.

The view of the Federation.—Desiring to meet the needs of the community and the allied professions, the Federation has adopted a policy of neutrality and conciliation. It claims that by no other means than those it provides can the collective voice of a great profession and its allies in the public service be made available in the councils of the nation. Amongst the 45 organisations coöperating at the present time may be mentioned the Royal Society of Medicine, the British Science Guild, the Medical Women's Federation, Medico-Psychological Association, Association of M.O.H., British Dental Association, Pharmaceutical Society, College of Nursing, Royal British Nurses Association, and Midwives Institute—mentioning larger bodies only. And as all the allied professions are fully represented it requires only the coöperation of the British Medical Association and the Medico-Political Union to make adequate representation of medicine possible. Is not this a goal worth some personal sacrifice?

I am, Sir, yours faithfully,

N. HOWARD MUMMERY.

The Federation of Medical and Allied Societies, 5, Vere-street, W.1., Dec. 21st, 1920.

SPIRITUALISM AND THE NEW PSYCHOLOGY.

To the Editor of THE LANCET.

SIR,—May I congratulate you on having secured for your Christmas Day number a review of Dr. M. Culpin's book on spiritualism by a whole-hogger believer in telepathy? Next Christmas I shall look forward to a number devoted entirely to ghost stories, spirit-rapping, *ouija* boards, &c.—an annual relief from the sobriety of your weekly review of British medicine.

I am, Sir, yours faithfully,

Loughton, Essex, Dec. 29th, 1920. LEONARD HILL.

THE X RAY TREATMENT OF RINGWORM: A WARNING.

To the Editor of THE LANCET.

SIR,—The increasing number of claims against medical practitioners in respect of permanent alopecia following upon the treatment of ringworm of the scalp by X rays renders it desirable that those who may have occasion to use that method of treatment should warn the patient's parents of the possible after-effects.

The violent reaction which occasionally follows even minimum doses of X rays, in spite of all precautions, is otherwise apt to create a suspicion of overdosage or negligent technique, and give rise to claims which might have been avoided by a preliminary word of caution. I am, Sir, yours faithfully,

JAMES NEAL,
General Secretary.

Medical Defence Union, Ltd., 4, Trafalgar-square, London, W.C.2, Dec. 23rd, 1920.

MEDICAL OFFICERS OF SCHOOLS ASSOCIATION.—The annual general meeting of the Medical Officers of Schools Association was held at 2, Savoy-hill, Victoria Embankment, London, W.C., on Dec. 17th, when Mr. R. C. Elmslie was elected president, and thanks were accorded to Dr. James Kerr, the retiring president. Having regard to the important position occupied by the journal, *School Hygiene*, it was agreed to continue its publication, and Dr. James Kerr and Dr. C. W. Hutt were elected editors. It was announced that Dr. E. H. Nash would read a paper on School Punishments.

Parliamentary Intelligence.

NOTES ON CURRENT TOPICS.

PARLIAMENT was prorogued on Thursday, Dec. 23rd, until Tuesday, Feb. 15th, 1921. The Royal Assent was given to a number of Acts, including the Women and Young Persons (Employment in Lead Processes) Act and the Employment of Women, Young Persons, and Children Act.

HOUSE OF COMMONS.

MONDAY, DEC. 20TH.

Substitutes for Salvarsan.

Mr. WATERSON asked the Minister of Health if he would furnish the names of the various substitutes for salvarsan and neo-salvarsan the use of which had been approved by his department; and if he would state whether his department guaranteed that the substitutes were exactly similar to the German salvarsan and neo-salvarsan.—Dr. ADDISON replied: The following substitutes for salvarsan and neo-salvarsan have been approved: Kharsivan, neo-kharsivan, arsenobillon, novarsenobillon, diarsenol, neo-diarsenol, galyl, and salvarsan (manufactured by an English firm of chemists). No guarantee of the kind suggested can be given, but there is good reason to believe that all these drugs, with the exception of galyl, correspond in general chemical constitution to the respective German preparations. They are all officially tested for toxicity before being placed on sale.

Dental Bill.

Dr. ADDISON introduced a Bill "to amend the Dentists Act, 1878, and the provisions of the Medical Act, 1886, amending that Act." The Bill was read a first time.

On Tuesday, Dec. 21st, the order of the second reading of this Bill was discharged and the Bill withdrawn. It is understood that it has been introduced for the purpose of discussion and that it will be re-introduced at the beginning of next session.

TUESDAY DEC. 21ST.

Ex-Service Men in Asylums.

Mr. LEONARD LYLE asked the Minister of Pensions if his department made any payments in connexion with ex-Service men who were in any asylums whatever in the country for the treatment of mental disease; why, if this was the case, both his department and the Ministry of Health abstained from giving figures; whether the number of such men had been stated officially to be inconsiderable; and whether it was possible, in view of payments made by his department, to give the public reliable information on the matter.—Mr. IAN MACPHERSON replied: I would draw my honourable friend's attention to the replies given to the honourable Member for Frome on June 28th, and to the honourable and gallant Member for Gateshead on July 30th, last. From these it will be seen that ex-Service men, confined in asylums and suffering from certifiable insanity due to war service, are by special arrangements treated as service patients with all the privileges of private patients. Their number on Dec. 9th was, I regret to say, 5634. The entire cost of their maintenance and treatment is borne by my department and, in addition, treatment allowances are made on substantially the same basis as in other cases of in-patient treatment.

Medical Appeal Tribunal for Wales.

Lieutenant-Colonel PARRY asked the Minister of Pensions whether he was aware that the medical appeal tribunal for Wales had been removed from Wales to hear appeal cases in England, and that consequently the hearing of appeal cases in Wales had been suspended, and what was the reason for such action.—Sir G. HEWART (Attorney-General for England) replied: I assume that this question refers to the Pension Appeal Tribunals set up under the War Pensions (Administrative Provisions) Act, 1919. The sitting of the tribunals in various large centres in England and Wales are arranged in accordance with the number of cases received in each district. The tribunal which sits almost continuously in Wales was temporarily removed to London for the fortnight commencing Dec. 6th. It returned to Wales yesterday. The arrangement was the result of (*a*) a diminution in the number of cases received from Wales, and (*b*) an increase in the number of London cases received.

Calves Used for Lymph Production.

Mr. LUNN asked the Minister of Health if he would state how the carcasses of the calves used for the production of vaccine lymph at the Government lymph establishment were disposed of after the lymph had been taken from them and the animals had been slaughtered.—Dr. ADDISON replied: The calves used for the production of lymph at the Government lymph establishment are hired, and after slaughter are examined by the veterinary surgeon of the

establishment. The carcasses sold for food are subject to further examination by officers of the local sanitary authorities. I am advised that there is no evidence whatever that the carcasses of vaccinated calves are unfit for food.

Public Vaccination Statistics.

Mr. KENYON asked the Minister of Health if he would furnish a statement showing the number of public vaccinations carried out in England and Wales in each year during the past 10 years, and the expenditure incurred in respect of the same out of national and local funds respectively.—Dr. ADDISON replied: The information asked for by my honourable friend is as follows:—

Year.	Number of successful vaccinations and re-vaccinations performed by public vaccinators at the cost of the rates.	Approximate expenditure incurred in respect of public vaccination.	
		Expenditure out of local rates.	Expenditure out of Exchequer Fund.
1909-10	415,718	£183,000	£25,000
1910-11	394,338	174,000	30,000
1911-12	362,757	165,000	23,000
1912-13	334,530	158,000	19,000
1913-14	315,067	152,000	16,000
1914-15	—	144,000	26,000
1915-16	—	138,000	12,000
1916-17	—	129,000	16,000
1917-18	232,648	116,000	21,000
1918-19	202,913	110,000	20,000

WEDNESDAY, DEC. 22ND.

Food Value of Milk.

Mr. HURD asked the Parliamentary Secretary to the Ministry of Agriculture what steps had been taken to carry out propaganda regarding the food value of milk, as promised six months ago, so as to remedy the insufficient consumption of milk, especially among children.—Dr. ADDISON (Minister of Health) replied: The Ministry of Agriculture and Fisheries and the Board of Education have agreed to coöperate with the Ministry of Health in this matter and have drawn up a scheme for including instruction as to the value and use of milk in various courses at schools and colleges.

Free Passages for Indian Medical Service.

Lieutenant-Colonel RAW asked the Secretary for India if he could make any statement regarding the promised concessions to officers of the Indian Medical Service in the matter of passages to and from India.—Mr. MONTAGU replied: The concession to officers of the Indian Medical Service of free passages to and from this country when sent home on sick leave has been sanctioned with effect from July 1st, 1919.

Committee on Smoke Abatement.

Major HAMILTON asked the Minister of Health whether he had accepted the conclusions of the Committee on Smoke Abatement; and, if so, whether he would explain why in Sheffield and elsewhere contracts for thousands of houses were being approved by his Department without these conclusions being specially brought to the notice of the local authorities concerned.—Dr. ADDISON replied: I have circulated copies of the Interim Report of the Committee on Smoke Abatement to all local authorities with a memorandum recommending consideration of the various substitutes suggested for the open coal fire where these can be economically adopted. The Report has also been brought to the notice of the Housing Commissioners. I understand that in the case of Sheffield the Housing Commissioner has been in touch with the local authority, and that the council are considering the Report with a view to the possibility of taking action in accordance with the suggestions made.

Military Cases of Small-pox.

Mr. RAFFAN asked the Minister of Health if he would state how many naval or military cases of small-pox were reported to his Department during the year 1919; what was the vaccinal condition of the cases; and how many ended fatally.—Dr. ADDISON replied: Four naval cases and 13 military cases of small-pox were reported to my Department during 1909. Four of the patients were stated to have been unvaccinated, and 3 of these cases proved fatal. There was one other fatal case, the vaccinal condition of which could not be ascertained. The remaining 12 cases were stated to have been vaccinated in infancy and one of them to have been revaccinated.

Surplus Hospital Accommodation.

Mr. ORMSBY-GORE asked the Minister of Health whether he would further consult the Association of Poor-law Unions with regard to the best method of rendering all surplus hospital accommodation in Poor-law institutions available for the treatment of the sick before re-introducing Clause 9 of the Ministry of Health (Miscellaneous Provisions) Bill; and whether it was his intention to make any alterations in the Bill before re-introducing it.—Dr. ADDISON replied: I am prepared to consider any suggestions, whether from the Poor-law Unions Association or from any other source, which are consistent with the declared policy of the Government that the treatment of the sick poor should be merged in the general health services of the community. In reply to the latter part of the question, I am not at present aware of any valid reason why the Clause should be altered.

THURSDAY, DEC. 23RD.

Washington Conference and Maternity.

Mr. G. BARNES asked the Minister of Health whether he was yet in a position to state the intentions of the Government with regard to the Washington Conference with respect to maternity.—Dr. ADDISON replied: As my right honourable friend is aware, the views of this Department were communicated some time ago. I understand that questions have arisen affecting international law. They have been referred to the law officers, and the matter is with them at present.—Mr. BARNES: Is it within the recollection of the right honourable gentleman that he has given me that answer almost in exactly similar terms to the same question for the last six months? Will he undertake to speed up the law officers? Is he aware that the Government are under an obligation to put this Convention to the House within 12 months of Jan. 26th last. There may be exceptional circumstances which would justify a postponement, but will he bear that fact in mind and endeavour to get these international law questions settled as speedily as possible? Is it not a fact that international law questions can only arise if the Government intend to put the Convention into operation, and inasmuch as the right honourable gentleman has said that they do not intend to do so, why raise these international law questions at all?—Dr. ADDISON: I really cannot profess to answer questions of international law; I can only say that as far as this Department is concerned its work on this matter was finished some two or three months ago. I understand that the questions are very difficult and intricate. I am advised that important international questions must be settled before the Government can put it to this House, and those are the matters which are causing the delay. I regret the delay, but I know that the law officers are being as expeditious as they can in the matter.

Divisional and Whole-time Medical Officers.

Colonel Sir ARTHUR HOLBROOK asked the Minister of Health if he would state the salaries to be paid to the four divisional medical officers and the 33 whole-time outdoor medical officers recently appointed by him and what he estimated would be their travelling expenses; what expenditure would be incurred for the clerical and nursing staffs for these officers; what payment had been sanctioned for rent and care of regional offices throughout the country; was he aware that the appointment of these officers to supervise and direct panel doctors throughout the country was strongly resented by the medical profession; and, in view of the large expense involved and having regard to the heavy financial obligations already existing, could the matter be reconsidered.—Dr. ADDISON replied: The salary to be paid to the four divisional medical officers is at the rate of £1600 a year, and for the 33 whole-time medical officers the salaries range from £1000 to £1400 a year in all cases inclusive, and providing that no additional payment is made in the shape of war bonus. The total travelling expenses of this staff for a full year is estimated at £8000. In addition a clerk has been assigned in certain areas, and the cost of clerical assistance under this head is estimated at £2700 a year. Where necessary nurses are employed to assist the medical officers at a fee of half a guinea a session. Where it has been necessary to rent premises for this work the arrangements have been made by the Office of Works, but I shall be glad to obtain particulars of cost and furnish them to my honourable and gallant friend. In answer to the last two questions I am certainly not aware that the policy adopted is strongly resented by the medical profession. This policy, which was adopted in 1914, has been continuously supported by medical men and by the Approved Societies; it is sound in itself, and will produce results abundantly justifying the expenditure in the saving of health and of the amounts paid in sickness benefit.

Section 79 of the Lunacy Act, 1890.

Mr. FREDERICK ROBERTS asked the Minister of Health whether he intended to have Section 79 of the Lunacy Act, 1890, posted up in the waiting-rooms of pauper asylums, since this step had been now for some time under the consideration of the Lunacy Board; and, if so, when would this commence.—Dr. ADDISON replied: I am advised that this proposal is by no means free from difficulties, and that there is much difference of opinion among experts as to its advisability. But the Board of Control have now completed

their inquiries, and I hope to receive their considered recommendation early in January.

The Care of Lunacy Documents.

Mr. FREDERICK ROBERTS asked the Minister of Health if he could say what became of the original reception order and accompanying medical certificates of inmates who were dead or who have been discharged from asylums, licensed houses, and registered hospitals, and also in the case where a licence was extinguished; did they remain permanently in the keeping of the medical superintendent or licensee; and, in view of the possibility of subsequent legal action taken by a sometime inmate, where the issue might turn upon the integrity and security of these original documents, would he take steps by regulation or otherwise to secure that these originals remained henceforth in the custody of the Lunacy Board and were safe from any interference with their contents.—Dr. ADDISON replied: The original admission papers relating to dead or discharged patients are retained by the authorities of institutions for as long as, in their discretion, they think it necessary. In the case of licensed houses there is no general rule with regard to the custody of documents when the licence is extinguished. But in view of the fact that copies of all these documents are in the possession of the Board of Control, I see no necessity for any regulations of the kind suggested, nor have I any reason to believe that the discretion left to the authorities is not properly exercised.

Medical News.

UNIVERSITY OF CAMBRIDGE: DIPLOMA IN MEDICAL RADIOLOGY AND ELECTROLOGY.—The Special Board for Medicine, on the recommendation of the Committee on Medical Radiology and Electrology, have approved the granting of the Diploma in these subjects to—

Sir A. D. Reid, L.R.C.P. Lond., M.R.C.S. Eng.; R. W. A. Saimond, M.D., Ch.M. Aberd.; H. Martin Berry, M.D. Liverp.; J. F. Hall-Edwards, L.R.C.P. Edin.; and J. T. Case, M.D. Ill.

At examinations held recently the following candidates were successful:—

THIRD EXAMINATION FOR MEDICAL AND SURGICAL DEGREES.

Part I., Surgery and Midwifery.—C. G. Ainsworth and A. B. Appleton, Downing; C. S. Atkin, A. B. Bratton, and W. M. Casper, Caius; M. T. Clegg, Jesus; B. K. T. Collins, Trinity; S. J. Cowell, Queen's; F. C. Cozens, Emmanuel; E. J. Crisp, Sidney Sussex; E. C. Curwen, Caius; H. B. Dodwell and E. A. Fiddian, Emmanuel; L. P. Garrod, King's; H. L. Garson, Clare; W. N. Goldschmidt, Pembroke; E. H. H. Granger, Clare; C. Griffith-Jones, Caius; J. C. N. Harris, Pembroke; G. A. Harrison, Caius; F. B. Hobbs, Sidney Sussex; L. W. Jones, Emmanuel; E. I. Lloyd, Trinity; W. H. Palmer and H. A. A. Pargeter, Sidney Sussex; F. P. N. Parsons, Pembroke; P. W. Putnam, Emmanuel; R. S. Scott and T. H. Somervell, Caius; E. D. Spackman, Queens'; G. D. C. Tracy and A. R. Walker, Emmanuel; T. T. B. Watson, Christ's; A. D. Whitelaw, St. John's; V. Wilkinson, Christ's; M. Wong, St. John's; F. G. Wood, Jesus; W. G. Woolrich, St. John's; H. B. Yates, Downing; and K. J. Yeo, Emmanuel.

Part II., Medicine, Pathology, and Pharmacology.—C. G. Ainsworth, Downing; F. Allen and J. C. Andrews, St. John's; C. S. Atkin and S. H. Barnett, Caius; D. C. Beaumont, Christ's; C. C. Beney, Jesus; P. F. Bishop, Clare; C. N. Carter, Trinity; P. D. H. Chapman, Sidney Sussex; A. O. Courtis, Pembroke; S. J. Cowell, Queens'; L. Cunningham, Downing; H. B. Dodwell, Emmanuel; W. D. Doherty, King's; H. V. Edwards, Trinity; L. S. Gathergood, Sidney Sussex; A. C. V. Gosset, Caius; E. B. H. Granger, Clare; J. R. Harris, Queens'; G. A. Harrison, Caius; F. B. Hobbs, Sidney Sussex; L. W. Jones, Emmanuel; J. M. Lawrie, Trinity; P. Lazarus-Barlow, Downing; F. S. Maclean, Jesus; J. W. McK. Nicholl and E. S. Orme, Queens'; R. Y. Paton, Trinity; C. J. Penny, Jesus; K. Playfair and J. L. Potts, Caius; W. B. Purchase, Sidney Sussex; G. P. N. Richardson, Christ's; A. G. Shurlock, Jesus; F. N. Sidebotham, Clare; J. A. B. Snell and F. V. Squires, Caius; W. S. Sykes, Emmanuel; D. C. L. Vey, Clare; H. N. Webber, A. T. Westlake, and A. D. Whitelaw, St. John's; J. Whittingdale, Downing; V. Wilkinson, Christ's; F. B. Winfield, Downing; W. G. Woolrich, St. John's.

UNIVERSITY OF LONDON.—At examinations held recently the following candidates were successful in the subjects indicated:—

M.D. EXAMINATION.

Branch I., Medicine.—Monty Baranov, Univ. Coll. Hosp.; Stanley Batchelor, William Moses Feldman, and Ernest Eugene Herga, London Hosp.; Kenneth Reed Hill, Univ. Coll. Hosp.; Geoffry Challen Linder and Rowland John Perkins, St. Bart.'s Hosp.; Evelyn Dennis Scott, Guy's Hosp.; and James Aubrey Torrens, St. George's Hosp.

Branch IV., Midwifery and Diseases of Women.—Henry William Evans, Guy's Hosp.; and Violet Ione Russell, London (R.F.H.) Sch. of Med. for Women.

Branch V., State Medicine.—Maitland Radford, Univ. Coll. Hosp.

Branch VI., Tropical Medicine.—George Alex Sheridan Madgwick, London Sch. of Trop. Med. and London Hosp.; and Edward Selby Phipson (University medal), Birmingham Univ. and London Sch. of Trop. Med.

M.S. EXAMINATION.

Branch I., Surgery.—Hugh Ernest Griffiths, St. Bart.'s Hosp.; Robert Lister Horton (University medal), Univ. Coll. Hosp.; Samuel Walter Maslen Jones, Middlesex Hosp.; Norbert Leo Maxwell Reader and Cedric Sydney Lane Roberts, Guy's Hosp.; and Henry James Drew Smythe and Douglas George Clutsam Tasker, Bristol Univ. and London Hosp.

UNIVERSITY OF MANCHESTER.—At examinations held recently the following candidates were successful in the subjects indicated:—

FINAL M.B. AND CH.B. EXAMINATION.

F. H. Anderson, May Blakiston, Phyllis M. Congdon, J. W. Crawshaw, A. M. El Aguizy, Florence M. L. Graham, E. M. Greaves, Albert Haworth, G. E. Hayward, Irma M. C. Jehansart, A. W. Kirkham, James Leather, G. H. Lees, Gertrude B. Leigh, P. B. Mumford (second-class honours and distinction in Obstetrics and Surgery), Terence O'Brien, Florence G. Sherry, Doris A. Taylor, Henry Tomlinson, and Raymond Williamson.

Medicine.—Martha F. Barritt and Violet M. Jewson.

Obstetrics.—T. E. Coope.

Forensic Medicine.—R. J. Allison, Caroline M. Edwardes-Evans, Cecil Nelson, H. D. Preston, and S. J. Woodall.

THIRD M.B. AND CH.B. EXAMINATION.

General Pathology and Morbid Anatomy.—R. S. van Aalten, P. D. Abbatt, Reginald Anderton, J. H. Appleton, Mary W. Atkinson (distinction in Pathology), J. B. Bennett, Doris H. Bentham, Benjamin Broman, G. H. Buckley, E. W. Clough, H. M. Coope, Margaret Derbyshire, O. M. Duthie, Kathleen M. Eastwood, Beatrice L. Ellison, H. E. Emmett, H. P. Fay, J. H. Fletcher, William Geraghty, Doris M. Hardman, Arthur Ingham, E. L. Jones, J. I. Kelly, Nora Mills, Winifred H. Mitchell, Louis Morgenstern, A. C. Newman, Hilda Pratt, G. T. Robinson, Abram Rosenstone, F. H. Scotson, Henry Southworth, G. B. Stenhouse, Leo Unsworth, Emmeline Wade, Margaret J. Warburton, Margaret Wild, James Worthington, and James Yates.

Pharmacology and Therapeutics.—Margaret Derbyshire, Gwendolen A. G. Edwardes-Evans, Richard Handley (distinction in Pharmacology), G. A. Lord, Louis Morgenstern, and Margaret J. Warburton.

Hygiene.—Lionel Boyars, Richard Handley, L. W. Kay, G. B. Lord, and Louis Morgenstern.

FINAL EXAMINATION FOR DIPLOMA IN DENTISTRY.

Alan Booth, Dorothy Marsden, and Norman Wood.

UNIVERSITY OF ST. ANDREWS.—At recent examinations the following candidates passed in the subjects mentioned:—

THIRD PROFESSIONAL EXAMINATION FOR M.B., CH.B. DEGREES.

Forensic Medicine and Public Health.—David A. K. Cassells, George R. M. Cordiner, and William A. Steel.

FINAL EXAMINATION FOR M.B., CH.B. DEGREES.

Margaret Jane Mudie Cuthbert, Jean Helen Dumbreck Fleming, Mabel Hodgson, Frances Lilian Knipe, Margherita Murray Lilley, Christian Elinor Little, and John Bain Macdonald.

CAMBRIDGE AND VIENNA.—A collection is being made among resident members of Cambridge University, graduate and undergraduate, in support of relief work in the University of Vienna, but it is believed that many Cambridge men no longer resident would wish to identify themselves with this attempt to help the greatest seat of learning in Central Europe at this time of most pressing need. The *Times* of Oct. 23rd recorded the death in Vienna from starvation of Professor Max Margules, the great meteorologist, who had been living on a pension of 400 kronen (equivalent to 8s.) a month; and it is only too clear that this is not an isolated or exceptional instance. In the coming winter both students and professors (with their families) will be in urgent want of the necessities of life. The Cambridge Executive Committee has asked for £5000, and all assistance which old Cambridge men can give will be needed if this sum is to be reached or even approached. Cheques should be sent to Barclay's Bank, Ltd., Cambridge, made payable to the "Universities' Relief Fund."

LONDON (ROYAL FREE HOSPITAL) SCHOOL OF MEDICINE FOR WOMEN.—The following appointments have been made by the Council: Sir Leonard Rogers, F.R.S., to be Stuart Mill Lecturer in Tropical Medicine; Miss Dorothy Maughan, M.P.S., to be Lecturer in Pharmacy. The Staff of the London School of Medicine for Women have announced that they will increase their donation to the Appeal Fund for the extension of the Hospital and Medical School from £500 to £1000. The extension is to provide beds for the class of workers who live in small flats or lodgings. For these illness is a haunting dread, as they cannot be nursed where they live, while they are unable to afford the high fees charged by good nursing homes. They can afford the cost of maintenance at the present charge of £4 per week. A few beds are now available for men and women at this charge, and 23 more will shortly be ready. Further accommodation for men, women, and children will be provided as soon as funds permit. Donations and subscriptions should be sent to Sir Francis Leyland Barratt, Bart., Honorary Treasurer, Royal Free Hospital, Gray's Inn-road, W.C.1.

NATIONAL ASSOCIATION FOR THE PREVENTION OF INFANT MORTALITY.—A congress will be held on Infant Welfare in London on July 5th, 6th, and 7th. Among the subjects to be discussed will be residential provision for mothers and babies; inheritance and environment as factors in racial health; the supply of milk, its physiological and economic aspects. Further particulars may be obtained from the secretary at 4, Tavistock-square, London, W.C.1.

MEDICAL MAGISTRATE.—The name of Dr. Chas. Owen Fowler has been added to the list of magistrates for the borough of Croydon.

MEDICAL CORONER.—Dr. R. L. Guthrie, O.B.E., barrister-at-law, has been appointed coroner for the Eastern District of the County of London. Dr. Guthrie was deputy coroner in N.E. London, when, on the outbreak of war, he joined the R.A.M.C. and served for nearly five years in France and at home. He retired with the rank of lieutenant-colonel.

INSTRUCTION IN HOSPITAL ADMINISTRATION.—A three months' course of lectures and demonstrations in hospital administration will be given at the Western Hospital, Seagrave-road, Fulham, London, S.W., by Dr. R. M. Bruce, medical superintendent, on Tuesdays and Fridays at 5 P.M. The course will begin on Tuesday, Jan. 4th, and is suitable for those reading for a diploma in public health. The fee for the course is £3 3s., and medical men desiring to attend a course of instruction are required before attending at the hospital to pay this fee to the clerk to the Metropolitan Asylums Board, Embankment, London, E.C., giving their full name and address.

THE PEOPLE'S LEAGUE OF HEALTH.—As a result of a meeting held by the League at the Cardiff City Hall on Dec. 15th last, under the chairmanship of the Lord Mayor, at which Sir Bruce Bruce-Porter, Dr. Eric Pritchard, Dr. Mary Scharlieb, and Dr. E. H. Stancomb, representing its Medical Council, were the speakers, a committee was formed to establish the work of the League in Wales. Among those organising the Welsh branch are Professor Edgar Collis, Talbot Professor of Preventive Medicine, Welsh National Medical School; Dr. Ewen J. Maclean, a member of the Consultative Council of the Ministry of Health; and Mr. D. W. Evans, Director-General of King Edward VII. Welsh National Memorial Association. The committee considers the present moment opportune for the furtherance of the work undertaken by the League in developing public demand for health legislation.

CENTRAL MIDWIVES BOARD.—A special meeting of the Central Midwives Board was held at Queen Anne's Gate Buildings, Westminster, on Dec. 21st, 1920, with Sir Francis H. Champneys in the chair. Several midwives were struck off the roll and in two cases midwives were placed on probation, the following charges amongst others having been brought forward:—

Being in attendance at a confinement and the child suffering from inflammation about the navel, the midwife did not explain that the case was one in which the attendance of a registered medical practitioner was required, as provided by Rule E. 21 (5), and the child suffering from illness supposed to be infectious, the midwife neglected to send to the local supervising authority any notification that she was herself liable to be a source of infection, as required by Rule E. 23 (c). A midwife did not take and record the pulse and temperature of her patients at each visit, as required by Rule E. 14, and she did not enter records of the pulse and temperature of her patients in a notebook or on a chart carefully preserved, as required by Rule E. 14. A midwife neglected to wash the patient's external parts with soap and water and to swab them with an efficient antiseptic solution before making the first internal examination, as required by Rule E. 8 (a); she did not disinfect her hands and forearms before touching the patient's generative organs, as required by Rule E. 4; she neglected to take and record the pulse and temperature of the patient at each visit, as required by Rule E. 14; and medical aid having been sought for the patient and child, she neglected to notify the local supervising authority thereof, as required by Rule E. 22 (1) (a). Without undergoing disinfection to the satisfaction of the local supervising authority a midwife continued in attendance upon other maternity patients, contrary to Rule E. 6. A patient suffering from excessive bleeding, the midwife did not explain that the case was one in which the attendance of a registered medical practitioner was required, as provided by Rule E. 21 (3), and the patient's mother desiring the attendance of a registered medical practitioner the midwife dissuaded her from securing his attendance (misconduct).

At a meeting of the Board held on the same day a letter was considered from Miss Clive Haydon, the honorary secretary of the Teachers Instruction Course Midwives' Institute, stating that the teachers of midwifery who attended the recent course of instruction at the Institute had passed resolutions urging the extension of the period of midwifery training and the advisability of a high qualification for approved teachers. The Board agreed with the advisability of raising the standard of midwifery training both for pupils and teachers whenever circumstances render such an advance practicable. Meanwhile any such voluntary extension of the duration of training would meet with the hearty approval of the Board.—A letter was considered from the medical officer of health for Kensington, asking if, in the event of the Kensington Council arranging for the nursing of a mother and child (the latter suffering from ophthalmia neonatorum) to be taken over by a midwife specially engaged by the council for the purpose, the midwife originally engaged would be discharged from all responsibility during the period subsequent to such taking over. The Board decided that the medical officer of health for Kensington be informed that the Board thinks that an arrangement whereby a nurse specially trained is available for bad cases of ophthalmia neonatorum would be very helpful, but does not think that midwives should be separated either from mothers or children under their care.—A letter was considered from the medical officer of health for the city of Worcester asking if it is considered desirable that investigation of the mode of practice of a midwife under Rule E. 25 should be carried out in the case of all midwives or only in those cases where the results of the midwife's work have not seemed satisfactory. The Board decided that the medical officer of health for Worcester be informed that Rule E. 25 (p. 37) reads as follows:—

"The local supervising authority shall make arrangements to secure proper inspection of the register of cases, bag of appliances, &c., of every midwife practising in the district of each authority, and, when thought necessary, an inspection of her place of residence and an investigation of her mode of practice."

This rule obliges the local supervising authority to secure a proper inspection of the register, &c., of every midwife, but leaves the inspection of the residence and mode of practice to the discretion of the local supervising authority. It is highly advisable that unnecessary inspection should be avoided as likely to annoy the patient, to cast doubt on the efficiency of the midwife, and generally to interfere with the working of the Act.

FEES OF DOCTORS CALLED IN BY MIDWIVES.—A new scale of fees for the payment by local supervising authorities of medical practitioners called in by midwives under Section 14 of the Midwives Act, 1918, has come into operation to take the place of that prescribed by the Local Government Board in December, 1918. The chief alterations made by the new scale are:—

(1) The fee for attendance at confinements is £2 2s. in all cases, instead of £1 1s. in ordinary cases, and £2 2s. in cases involving operative assistance.

(2) A special fee of £1 1s. is prescribed for suturing the perineum and for other operative assistance occurring after the confinement, and also for attendance at abortions or miscarriages.

(3) The fee for visits is increased to 5s. by day and 10s. by night.

(4) It is made clear that a fee is not payable by the local supervising authority where the doctor has agreed to attend the patient under arrangement made by or on behalf of the patient or by any club, medical institute, or other association of which the patient or her husband is a member, or where the doctor receives or agrees to receive a fee from the patient or her representative, or in respect of any services performed by the doctor after the expiry of four weeks from the day of birth.

The Minister of Health has approved an alteration in the rules of the Central Midwives Board, which makes Section 14 of the Midwives Act applicable to all cases in which a midwife calls in a doctor under the C.M.B. rules. Rule E.20 now reads:—

In all cases of illness of the patient or child or of any abnormality occurring during pregnancy, labour, or lying-in, a midwife, as soon as she becomes aware thereof, must call in to her assistance a registered medical practitioner, using for this purpose the form of sending for medical help properly filled up and signed by her. The conditions referred to in this rule shall be deemed to be emergencies for the purpose of Section 14 of the Midwives Act, 1918.

The local supervising authority is, of course, empowered to recover these fees except in cases of poverty.

THE LATE DR. G. C. GRANT.—George Cowie Grant, of Dufftown, died in a nursing home in Aberdeen on Dec. 23rd. He was the fifth son of Major William Grant, of Balvenie House, Dufftown, and brother of the late Mr. J. Grant, well known as county clerk of Banffshire and town clerk of Banff. Dr. Grant was a graduate of Aberdeen University and took the degree of M.B. and C.M. in 1894. He afterwards practised his profession in England for about two years at Birmingham City Asylum and for six years as a practitioner in Colne, Lancashire. In 1902, for personal reasons, he gave up his professional career, but did not cease to take an interest in health matters. For a number of years he was chairman of the isolation hospital at Dufftown, convener of the public health committee of the county council, and chairman of the board of control. For a term of three years he was provost of Dufftown. He was also a member of the county council and a justice of the peace for the county. About two years ago he was appointed convener of the county of Banff. Dr. Grant took a deep interest in all that pertained to the welfare of the community and was everywhere held in high esteem. He is survived by a widow and family.

MEDICO-LEGAL SOCIETY.—A meeting of this society will be held at 11, Chandos-street, London, W., on Tuesday, Jan. 18th, at 8.30 P.M., when a paper will be read by Dr. H. Gibson Sutherland on Medical Evidence in the Staunton Murder Trial.

SOCIETY FOR THE PREVENTION OF VENEREAL DISEASE.—The Executive Committee of the Society for the Prevention of Venereal Disease has recently been enlarged by the inclusion of the following members:—Mr. W. Willson Cobbett, Captain W. E. Elliot, M.P., Dr. A. Mearns Fraser, Dr. Jane Lorimer Hawthorne, Mr. Cuthbert Laws (General Manager of Shipping Federation), Mr. Harry Machin, Captain T. Michell, R.N., Surgeon Vice-Admiral Sir James Porter (late Director-General, Naval Medical Department), and Mr. A. H. Tubby, F.R.C.S.

ROYAL MEDICAL BENEVOLENT FUND.—At the last meeting of the Committee held on Dec. 14th, 1920, 30 cases were considered and £315 voted to 25. The following is a summary of some of the cases relieved.

Daughter, aged 61, of M.R.C.S Eng. who practised in London and died in 1885. Her mother, who died in 1906, and self were left with very limited means. The applicant now has only £1 per week, and owing to ill-health and increased cost of living finds it impossible to pay her way and has got into debt. Highly recommended.—Widow, aged 71, of M.D. Glasgow who practised in Scotland and died in 1889. Lives with a sister who has £10 and applicant has £50. They endeavour to supplement this by letting rooms, and last year received from this source £65. Rent £54. —Widow, aged 75, of M.R.C.S. Eng. who practised in Brixton and died in 1883. Applicant was left totally unprovided for with four children, all of whom are married and unable to assist her. Only income the Old-age Pension, 10*s.* per week, and occasional gifts from friend. Pays 8*s.* per week for one room. Relatives who in the past helped are now all dead.—Widow, aged 31, of M.B. Edin. who had for two years worked on a Pensions Board and previously worked as a locum tenens and died in 1920. Applicant left quite unprovided for with two children, ages 4 and 5. Deceased's colleagues on the Pensions Board collected a sum of money to assist applicant, but this will soon be exhausted. Having to look after the children she cannot undertake a post. Would like to get the children into a home. Expenses: Rent £1 per week; board, 25*s.* per week; storage of furniture, 5*s.*—Widow, aged 41, of M.R.C.S. Eng. who practised at Plymouth for over 30 years and died in September, 1920. Applicant left with son, aged 12, and girl, 10, with insufficient means. Health bad, so unable to work. Certain income about £35, and has had to spend some of her capital to pay her way. Rent 16*s.* per week.

Subscriptions may be sent to the honorary treasurer, Sir Charters J. Symonds, C.B., F.R.C.S., at 11, Chandos-street, Cavendish-square, London, W. 1.

OUTBREAK OF SMALL-POX IN ABERDEENSHIRE.—Two cases of small-pox from the Longside district of Aberdeenshire were admitted into the County Infectious Diseases Hospital at Aberdeen on Dec. 22nd. The outbreak took place in a family at Rova, and its origin is as yet unknown. The persons affected are men, aged 66 and about 21. The diagnosis has been officially confirmed.

HEALTH SCHEME FOR THE COUNTY OF ABERDEEN.—The proposals of the Scottish Board of Health in connexion with maternity service, child welfare, and the general public health administration of the county have been under consideration by a special committee of the Aberdeen County Council. The Council is recommended to appoint Dr. H. J. Rae, the tuberculosis medical officer for Aberdeenshire, to the office of deputy M.O.H. for the county, and to continue his present administration of the tuberculosis scheme for the combined area, and also to act as administrative and executive officer under the new scheme. Dr. Rae is also recommended for the post of inspector of midwives under the scheme. The Committee recommends that the salaries of Dr. J. P. Watt and Dr. Rae be increased by £200 each from May 15th last, subject to the approval of the Scottish Board of Health, the increase in the case of Dr. Rae to be charged against the scheme for maternity service and child welfare. Nursing associations are proposed for every district, so that the total number of nurses in the county would amount to 31.

DONATIONS AND BEQUESTS.—Under the will of the late Mr. F. Gorringe, who left £450,000 for charitable purposes, subject to the life interest of his wife, whose death was recently announced, the St. George's Hospital and the Westminster Hospital will receive an eighth share each.—*Manchester Hospitals:* £5000 were received by the Salford Royal Hospital towards the cost of the new nurses home, as a thank-offering from Edward Pilkington, Laurence Pilkington, and Mary Gavin Pilkington. A legacy of £1000 from the executors of the late Mr. Lewis Atkinson, of Higher Broughton, was also received. It was decided to name a bed after the donor. From the Dickanson Charity £200 were received to be applied as income for present necessities, and £100 from Mrs. Lomas Harrison, of Hale. The St. Mary's Hospitals have received from the executors of the late Mr. Lewis Atkinson £900, and from those of the late Mr. W. Cooney £73. A sum of £1000 has also been received from Mrs. E. Lees for the endowment of a bed, and £750 from the Anson Golf Club for the endowment of a cot. Further donations to the amount of £325 have also been received by the board of management.—*Hospitals in the North of Scotland:* The employees of the Great North of Scotland Railway met recently to consider the allocation of the money which had been collected during the year on behalf of local charitable institutions. The chairman reported that the sum of £432 9*s.* 5*d.* had been collected over the system among the traffic, permanent way, and head office staffs. Over 95 per cent. of the staff had contributed to the collection. He added that the Board of Directors had announced their intention of giving a subscription of £200 to the Aberdeen Royal Infirmary. The money collected was allocated as follows: Aberdeen Royal Infirmary, £432; Sick Children's Hospital, £30; Eye Institute, £5; Chalmers's Hospital, Banff, £15; Gray's Hospital, Elgin, £15; Turner Memorial Institute, Keith, £15. The collections made by the employees of the Northern Co-operative Society amount to £150, an increase of 50 per cent. Most of the employees now make weekly contributions. The sum of £150 was allocated as follows: Royal Infirmary, £75; Royal Hospital for Sick Children, £20; Aberdeen District Nursing Association, £10; Eye Institution, £7; Morningfield Hospital, £5; Convalescent Hospital, Newhills, £10; Convalescent Hospital, Cults, £10; Aberdeen Dispensary, £8; and the Asylum for the Blind, £5. £1362 have now been contributed by the employees since the fund was started. The school teachers of Aberdeen have set an excellent example to other members of the community in subscribing the handsome sum of £425 15*s.* 1*d.* to Sir James Taggart's scheme for assisting the Sick Children's Hospital. This represents more than four hours' pay. Many teachers gave a whole day's pay.

MANCHESTER UNIVERSITY DEGREE DAY.—Degrees were conferred on Dec. 22nd by the Vice-Chancellor on a number of graduates. For the first time in the history of the University the degree of Doctor of Philosophy was awarded, the recipient having done research work in organic chemistry. Of the 21 Bachelors of Medicine and of Surgery seven were women.

ABERYSTWYTH DISTRICT MEDICAL OFFICERSHIP.—The deadlock between Aberystwyth guardians and the Ministry of Health, on which we have already commented (THE LANCET, Nov. 27th, p. 1119, and Dec. 25th, p. 1328), advanced another stage at a meeting on Monday. At the last meeting of the guardians an intimation was received from the Ministry of Health that the salary of Dr. J. A. Rees, who had been appointed in preference to Dr. A. Thomas, who served throughout the war, would not be sanctioned by the Ministry, and it was agreed to ask Dr. Rees for his views on the subject. Dr. Rees replied that he left the matter in the hands of the majority of the board. The clerk now explained that it would be necessary to appoint a temporary medical officer, and the majority of the guardians promptly reappointed Dr. Rees as temporary medical officer.

CARDIFF MEDICAL SOCIETY.—At a meeting of this society on Dec. 14th, 1920, specimens were shown. Mr. Geary Grant showed: (1) an Appendix and a Meckel's diverticulum which had become adherent to the mesentery of the ileum, removed from a case which had been admitted with signs of acute appendicitis; (2) three small Epithelial Inclusion Cysts from a patient who had suffered an injury to the finger; they were found lying on the tendon sheath, simulating a ganglion; (3) a Thyroid suspected of being malignant, removed June, 1920, from a patient who had returned with a freely movable gland in the neck, which he proposed to remove. Dr. D. R. Paterson discussed the effect on the voice of removing the thyroid, and reported a case of complete paralysis of the vocal cords requiring a tracheotomy tube. Mr. Tenison Collins showed: (1) a Pediculated Fibroid Tumour, partly cartilaginous, removed from the anterior surface of the fundus uteri from a patient suffering severe menorrhagia with the uterine wall otherwise normal; (2) a Phosphatic Stone, weighing 4 ounces, from a woman suffering from retention of urine, removed by vaginal cystotomy, one end of which appeared to have fallen on the urethra, acting as a valve; (3) the Handle of a Crochet-hook, slightly sharpened, from a woman three months' pregnant, located by X rays and found lying in the utero-vesical pouch, causing no sign of irritation, the insertion and removal of which had no effect on pregnancy. Mr. Geary Grant reported removing a phosphatic mass round a nucleus of "slippery elm" by suprapubic cystotomy. Mr. J. O. D. Wade showed an Oxalate of Lime Vesical Calculus from a boy aged 19 years, who passed urine every half hour, the history dating from birth. A sound would not enter the bladder. The calculus was removed by suprapubic cystotomy with great difficulty, owing to the sharp spicules fitting into folds of the mucous membrane.

BOOKS, ETC., RECEIVED.

BUTTERWORTH AND CO., London, India, Canada, and Australia.
Elements of Hygiene and Public Health. By Rai Bahadur Jaising P. Modi, L.R.C.P. & S. Edin. With Introduction by Lieut.-Col. E. J. O'Meara, I.M.S. 2nd ed., revised and enlarged. Pp. 497. 12s.

LE FRANÇOIS, 91, Boulevard Saint-Germain, Paris.
Formulaire des Milieux de Culture en Microbiologie. Par Dr. Déribéré Desgardes. Pp. 98. Fr.4.
Prothèse Dentaire. L'Art de l'Empreinte Technique. Pratique de la Prothèse. Par Maurice Wisner, Chirurgien-Dentiste. Pp. 224. Fr.12.

FISCHER, GUSTAV, Jena.
Die Lipomatosis und ihre klinischen Formen: ein Beitrag zur Physiologie und Pathologie des Fettgewebes. Von Dr. H. Günther. Pp. 216. M.40.

HODGE, WILLIAM, AND CO., Edinburgh and London.
Trial of the Wainwrights. Edited by H. B. Irving, M.A. With an Appreciation of the Editor by Sir Edward Marshall Hall, K.C. Pp. 235. 10s. 6d.

KEGAN PAUL, TRENCH, TRUBNER, AND CO., London. E. P. DUTTON AND CO., New York.
In Search of the Soul, and the Mechanism of Thought, Emotion, and Conduct. A Treatise in Two Volumes containing a Brief but Comprehensive History of the Philosophical Speculations and Scientific Researches from Ancient Times to the Present Day, as well as an Original Attempt to account for the Mind and Character of Man and establish the Principles of a Science of Ethnology. By Bernard Hollander, M.D. Vol. I., pp. 516; Vol. II., pp. 361. £2 2s.

MACLEHOSE, JACKSON, AND CO., Glasgow. MACMILLAN AND CO., London.
Memories and Musings of a Hospital Surgeon. Pp. 192. 7s. 6d.

MACMILLAN AND CO., London and New York.
Physiology and Pathology of the Cerebro-spinal Fluid. By Prof. W. Boyd. Pp. 176. 30s.
Old at Forty or Young at Sixty. By R. S. Carrol, M.D. Pp. 148. 13s.

MALOINE, A., ET FILS, Paris.
Traité de Pathologie Médicale et de Thérapeutique Appliquée. Publié sous la direction de Emile Sergent, Membre de l'Académie de Médecine, Médecin de la Charité; L. Ribadeau-Dumas, Médecin des Hôpitaux; L. Babonneix, Médecin des Hôpitaux. Tome XXXII., Radiologie, Radio-Diagnostic Radiothérapie, Radiumthérapie. Par Béclère, Cottenot, Simone Laborde. Pp. 520. Fr.30.

MASSON ET CIE, Paris.
Nouveau Traité de Médecine. Publié sous la direction de MM. les Professeurs G. H. Roger, Fernand Widal, P. J. Teissier. Secrétaire de la Rédaction: M. Garnier. Fascicule I., Maladies Infectieuses. Pp. 482. Fr.35.

METHUEN AND CO., London.
Crowley's Hygiene of School Life. By C. W. Hutt, M.D. 4th ed., revised. Pp. 450.

OXFORD UNIVERSITY PRESS, London, New York, Toronto, Melbourne, and Bombay.
Carnegie Endowment for International Peace. Preliminary Economic Studies of the War. Early Effects of the War upon the Finance, Commerce, and Industry of Peru. By L. S. Rowe, Ph.D. Pp. 60.

SAUNDERS, W. B., COMPANY, Ltd., London and Philadelphia.
Advanced Lessons in Practical Physiology for Students of Medicine. By Russell Burton-Opitz, S.M., M.D. Pp. 238. 18s.
Laboratory Manual of the Technic of Basal Metabolic Rate Determinations. By Walter M. Boothby, A.M., M.D., and Irene Sandiford, Ph.D. Pp. 117. 24s.
Laboratory Manual and Text-book of Embryology. By Charles William Prentiss. Revised and rewritten by Leslie Brainerd Arey, Professor of Microscopic Anatomy at the Northwestern University Medical School. 3rd ed., enlarged. Pp. 412. 27s 6d.
A Text-book of Pathology. By Prof. W. G. MacCallum. 2nd ed., thoroughly revised. Pp. 1155. 45s.

Appointments.

JOHNSTON, G. S., M.B., Ch.B. Edin., has been appointed Assistant Tuberculosis Officer and Assistant Medical Officer of Health for the City of Dundee.

LORIMER, G. N., M.B., B.S. Melb., Medical Registrar to St. Mary's Hospital, Paddington, W.

Certifying Surgeons under the Factory and Worshop Acts: ISARD, C. V., M.R.C.S., L.R.C.P. Lond. (North Tawton); TRUMPER, W. A., M.R.C.S., L.R.C.P. Lond. (Ivybridge); JOHNSTON, A. H., M.R.C.S., L.R.C.P. Lond. (Hull); HACKETT, E. L. M., L.R.C.P. & S. Irel., L.R.F.P.S. Glasg. (Usk); JAMES, T. G., M.R.C.S., L.R.C.P. Lond. (Pontypool).

Vacancies.

For further information refer to the advertisement columns.

Bath, Royal United Hospital.—H.S. and H.P. £150 each.
Belfast County Borough, Municipal Hospital for Tuberculous Children, Graymount.—Visiting S. £350.
Birkenhead Education Committee.—Asst. Sch. M.O. £450.
Birmingham General Hospital.—Res. Anæsth., H.P., and H.S. £100. Also H.S. for Skin and Venereal Depts. £125.
Bradford Royal Infirmary.—Res. Surg. O. £250. H.S. £200.
Bristol General Hospital.—Surgical Registrar.
Bristol Royal Infirmary.—H.S. £120.
Burnley, Victoria Hospital.—H.S. £250.
Cancer Hospital (Free), Fulham-road, London, S.W.—Director of Research Inst. and Director of Path. Dept. £1200 and £800 respectively.
Cardiff, King Edward VII. Hospital.—Ophthal. H.S. £200.
Cheshire County Asylum, Parkside, Macclesfield.—Asst. M.O. £350.
City of London Hospital for Diseases of the Chest, Victoria Park, E.—Res. M.O. £250.
Colchester, Severalls Mental Hospital.—Asst. M.O. 7 gs. per week.
Colonial Service.—M.O.'s for West African Medical Staff, Government Service in Malaya, East African Protectorates, West Indies (including British Guiana), Fiji, and the Western Pacific, &c.
Derby, Derbyshire Royal Infirmary.—Ven. Dis. O. £750.
Doncaster Royal Infirmary and Dispensary.—Sen. and Jun. Res. M.O.'s. £250 and £225.
Down District Asylum, Downpatrick.—Sen. and Jun. Asst. M.O.'s. £350 and £300.
Durban, Government Hospital.—Asst. M.O. £484.
East Ham County Borough Education Committee.—Asst. Sch. M.O. £500.
East Suffolk and Ipswich Hospital.—H.S. £200.
Evelina Hospital for Children, Southwark, S.E.—H.S. £160.
Hospital for Epilepsy and Paralysis, Maida Vale, W.—Hon. Anæsth.
Hospital for Women, Soho-square, W.—Clin. Assts.
Hull Royal Infirmary.—Asst. H.S. £150.
Ilford Urban District Council.—Female Asst. M.O.H. £400.
King's College for Women, Household and Social Science Department, Campden Hill-road, W.—Asst. in Dept. of Hygiene and Bacteriology. £400-£500.
Leeds General Infirmary.—Res. Cas. O. £150. Ophthal. H.S. £50. Two H.S.'s. Two H.P.'s.
London County Mental Hospital Service.—Sixth Asst. M.O. £300.
London (Royal Free Hospital) School of Medicine for Women.—Prof. of Obstet. and Gynæc. and Direc. of the Obstet. and Gynæc. Unit. £2000.
Manchester, Barnes Convalescent Hospital, Cheadle.—Res. M.O. £300.
Manchester Northern Hospital for Women and Children, Park-place, Cheetham Hill-road.—H.S.
Manchester Royal Infirmary.—Accident Room H.S. £200.
Newark Hospital and Dispensary.—Res. H.S. £200.
Newcastle-upon-Tyne Hospital for Sick Children.—Jun. Res. M.O. £200.
Nottingham General Hospital.—H.P. £200.
Ryde, Royal Isle of Wight County Hospital.—Res. H.S. £250.
Sheffield Royal Hospital.—Asst. Cas. O. £150.
Sheffield Royal Infirmary.—Asst. Cas. O. £150.
Stockport Infirmary.—Asst. H.S. £220.
Throat Hospital, Golden-square, W.—Hon. Med. Registrar.
University College Hospital, Gower-street, W.C.—Hon. Asst. Ear, &c., Dept. Also M.O. £250.
West London Hospital, Hammersmith-road, W.—P. Also Hon. Obstetric Registrar.
Wigan Education Committee.—Asst. Sch. M.O. £500.
Wilts County Council.—Female Asst. County M.O.H. and Asst. Sch. Med. Inspec. £600.
Wolverhampton and Staffordshire General Hospital.—Res. Surg. O. £300.

THE Secretary of State, Home Office, S.W., gives notice of a vacancy for a Certifying Surgeon under the Factory and Workshop Acts at Caterham.

Births, Marriages, and Deaths.

BIRTHS.

WALLACE.—On Dec. 7th, 1920, in Calcutta, the wife of Captain Q. V. B. Wallace, M.C., R.A.M.C., of a son.

WHEELER-BENNETT.—On Dec. 22nd, 1920, at "Grenofen," Steyning, Sussex, the wife of Dr. Clement Wheeler-Bennett, of a son.

WHITE.—On Dec. 12th, 1920, at 1, Albemarle-road, Withington, Manchester, the wife of Charles Powell White, M.D., F.R.C.S.—a daughter.

WIGHT.—At Swatow, China, on Nov. 14th, 1920, to Dr. and Mrs. A. Wight, English Presbyterian Mission—a daughter.

MARRIAGES.

HEATON—WHEELER-BENNETT.—On Dec. 21st, 1920, at St. Luke's Church, Bromley Common, Kent, Trevor Braby Heaton, O.B.E., M.D., M.R.C.P., to Constance Irene, only daughter of J. W. Wheeler-Bennett, C.B.E., J.P., and Mrs. Wheeler-Bennett, of Ravensbourne, Keston, Kent.

JOHNSTONE—DEMPSTER.—On Dec. 21st, 1920, at St. Ninian's Cathedral, Perth, George Gordon Johnstone, M.C., M.D., D.P.H., to Constance Margaret, eldest daughter of Mr. and Mrs. T. Dempster, of Perth.

LAWRENCE—GOODRIDGE.—On Dec. 20th, 1920, at St. Andrew's Church, Bournemouth, Sidney Cameron Lawrence, M.B., Ch.B., D.P.H., to Maria Louisa, widow of John Perch Goodridge.

DEATHS.

DOUGLAS.—On Dec. 22nd, 1920, at Devonshire-street, Portland-place Arthur Douglas, M.D., Senior Physician, British Hospital for Mental Disorders and Nervous Diseases, aged 70.

JOHNSTON.—On Dec. 22nd, 1920, at Braehead, Lugar, Ayrshire, Robert Johnston, M.B., C.M., late of Dundee, in his 74th year.

MAIR.—On Dec. 21st, 1920, at Westbourne-terrace, W., Robert Slater Mair, M.D., in his 95th year.

MARSDEN.—On Dec. 19th, 1920, at St. Thomas's Hospital, London, after a long and painful illness contracted on active service, Walter Gibson Marsden, M.A., M.B., B.Ch., late Captain, R.A.M.C.

NEAL.—On Dec. 23rd, 1920, at Bolingbroke-grove, S.W., John Breward Neal, M.R.C.P., in his 73rd year.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

Medical Diary.

SOCIETIES.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.

MEETINGS OF SECTIONS.

Wednesday, Jan. 5th.

SECTION OF SURGERY: at 5.30 P.M. (Exhibits at 4.30 P.M.)

Paper:

Mr. James Berry: A Further Series of 500 Goitre Operations, with Special Reference to After Results (illustrated by the epidiascope and demonstration of patients).

Abstracts of the notes with temperature and pulse charts of every case will be exhibited, together with a large number of pathological specimens, which will be on view at 4.30 P.M.

The meeting will be of great interest to the members of the Sections of Medicine and Laryngology.

Thursday, Jan. 6th.

SECTION OF OBSTETRICS AND GYNÆCOLOGY: at 8 P.M.

Short Communication:

Dr. Louise McIlroy: The Use of Morphia in Labour.

Paper:

Mr. Percival Cole: A Series of 43 Cases of Inoperable Uterine Carcinoma treated by the Cold Cautery Method of Percy.

Tuesday, Jan. 11th.

SECTION OF PSYCHIATRY: at 8.30 P.M.

Paper:

Dr. Morowoka: The Morbid Conditions of the Choroid Plexus in Mental Disease (illustrated by epidiascope).

Thursday, Jan. 13th.

SECTION OF NEUROLOGY: at 8.30 P.M.

Informal Meeting for free discussion (tea, coffee, smoking).

N.B.—As this is the first of these evenings it is hoped that Members will endeavour to attend and, if possible, exhibit objects of interest.

Friday, Jan. 14th.

CLINICAL SECTION: at 5.30 P.M. (Cases at 5 P.M.)

Cases: The following will be shown by—

Mr. W. E. Tanner: Case of Osteochondritis Deformans.

Mr. W. H. Ogilvie and Mr. Massie: Two Cases of Fracture-Dislocation of the Ankle.

Mr. Bonar: Impacted Fracture—Separation of Lower Epiphysis of the Femur.

Other cases will be shown.

SECTION OF OPHTHALMOLOGY: at 8.30 P.M. (Cases at 8 P.M.)

Cases and Exhibits:

Mr. G. Winfield Roll: Foreign Body Retained in the Eye for Many Years.

Mr. B. T. Lang: A New Scotometer.

Papers:

Dr. Ransom Pickard: Variations in the Size of the Physiological Cup, and their Relation to Glaucoma.

Mr. B. T. Lang: Scotometry.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

WEST LONDON POST-GRADUATE COLLEGE, West London Hospital, Hammersmith, W.

MONDAY, Jan. 3rd.—2 P.M., Dr. G. Stewart: Medical Out-patients. Mr. MacDonald: Surgical Out-patients. Dr. Simson: Diseases of Women. Dr. Morton: X Ray Department.

TUESDAY.—2 P.M., Dr. Burnford: Medical Out-patients. Mr. T. Gray: Surgical Out-patients. Mr. Banks Davis: Diseases of the Throat, Nose, and Ear. Dr. Pernet: Skin Department.

WEDNESDAY.—10 A.M., Mr. MacDonald: Genito-Urinary Department. 2 P.M., Mr. Addison: Operations. Mr. Gibb: Eye Department. Mr. D. Armour: Visit to Surgical Wards.

THURSDAY.—2 P.M., Dr. G. Stewart: Medical Out-patients. Mr. D. Armour: Operations. Mr. B. Harman: Eye Department. Mr. Baldwin: Orthopædic Department.

FRIDAY.—10 A.M., Mr. D. Buxton: Dental Department. Dr. McDougal: Electrical Department. Dr. Robinson: Gynæcological Operations. 2 P.M., Dr. Burnford: Medical Out-patients.

SATURDAY.—10 A.M., Dr. A. Saunders: Medical Diseases of Children. 2 P.M., Dr. Owen: Medical Out-patients. Mr. Sinclair: Surgical Out-patients.

Daily:—10 A.M. Ward Visits. 2 P.M., In-patient, Out-patient Clinics and Operations.

ST. JOHN'S HOSPITAL FOR DISEASES OF THE SKIN, 49, Leicester-square, W.C.

THURSDAY, Jan. 6th.—6 P.M., Chesterfield Lecture:—Dr. W. Griffith: Eczema.

ROYAL INSTITUTION OF GREAT BRITAIN, Albemarle-street, Piccadilly, W.

Christmas Lectures on the Haunts of Life, by Prof. J. A. Thomson:—

TUESDAY, Jan. 4th.—3 P.M., Lecture III.:—The Great Deeps.

THURSDAY.—3 P.M., Lecture IV.:—The Freshwaters.

SATURDAY.—3 P.M., Lecture V.:—The Conquest of the Land.

SALFORD ROYAL HOSPITAL AND ANCOATS HOSPITAL POST-GRADUATE DEMONSTRATIONS, at the two Hospitals alternately.

THURSDAY, Jan. 6th.—4.30 P.M., Mr. Macalpine: The Interpretation of Symptoms of Urinary Disease. (At Salford Royal Hospital.)

Notes, Short Comments, and Answers to Correspondents.

SOME PROBLEMS IN MARINE HYGIENE.[1]

WITH SPECIAL REFERENCE TO MERCHANT SHIPS.

BY SURGEON VICE-ADMIRAL SIR ROBERT HILL, K.C.M.G., C.B., C.V.O.,

MEDICAL DIRECTOR-GENERAL OF THE ROYAL NAVY.

I. VENTILATION AND ACCOMMODATION IN SHIPS.

The Foundation of Naval Hygiene.

THE most prominent pioneers of naval hygiene were three medical officers—James Lind, who began his sea service in 1739, and two others, Thomas Trotter and Gilbert Blane, who began theirs in 1779. These three were men of widely different characteristics, but they had in common the aspiration to improve the health of our seamen and the sanitary conditions under which they lived. Lind—methodical and painstaking, far-seeing in his suggested improvements—could not stand against opposition and became pessimistic. Trotter, impetuous and a fighter, obtained minor reforms; Blane, full of worldly wisdom and tact, ingratiated himself with the authorities—who were absolutely ignorant of naval hygiene—and won them over to his side. These pioneers set themselves to eradicate diseases in the fleets and merchant ships and to bring the general conditions of living to some degree of sanitation.

The personnel was chiefly ravaged by scurvy, small-pox, and typhus, which sometimes carried off four-fifths of a naval or mercantile expedition. Reforms were hard to enforce; even when lime-juice became known as a preventive of scurvy, and vaccination had proved its value in combating small-pox, very little advantage was taken of either. In 1761 Lind introduced the distillation of sea-water to make drinking-water, but distillation was probably adopted in very few ships at that time. He, no less than Trotter and Blane, was convinced of the necessity of ventilation and cleanliness, recognised that infection of certain diseases was carried by personal contamination and by clothing, and advocated isolation of infected persons and the fumigation of closed compartments. Trotter believed in vaccination against small-pox, then a terrible scourge in the Navy, but not until 1800 was an Order issued permitting surgeons to vaccinate seamen who desired it. In 1795 Blane became one of the two Medical Commissioners on the Board of Sick and Wounded Sailors; owing to his efforts the general use of anti-scorbutics became obligatory in the following year. He paid particular attention to the seaman's diet, recognising that it was not salt that caused scurvy, but a deficiency of other things in diet, a fact that is now well understood to be a cause of other diseases, such as beri-beri. In this way the foundations of marine hygiene were laid; we now recognise that most of the general principles of hygiene observed on shore can also be applied to men afloat in the Navy or Mercantile Marine, although the ship is still subject to particular limitations of size, occupation, and climate.

Ventilation.

Efficient ventilation of a ship is perhaps the most difficult problem of marine hygiene. Pryor has likened a ship to a bottle, through the neck of which fresh air has to come in and foul air escape. At one time wind-sails were the only means of artificial ventilation known. These are, in the words of Blane, "wide tubes formed of canvas and extended by hoops into the form of a cylinder, which pass from the external air into the lower parts of the ship through hatches"; but when the ship was battened down they could not be used. As far back as the end of the seventeenth century square wooden trunks, subsequently replaced by brass trunks (the idea being borrowed from a French frigate) were conducted from the hold or lower deck to the open air; this was the germ of origin of our present excellent system. At the present time it is stated in the Board of Trade instructions that in merchant ships "no hard-and-fast rule can be laid down as to the system of ventilation to be adopted ..... but that there should not be less than two ventilators, one serving as an inlet for the admission of fresh air, and the other as an outlet for escape of impure air." These must be fitted clear of bunks, so as not to cause discomfort to occupants. "To ventilate forecastles, poops, and between deck spaces, the simplest method is to have an iron pipe with revolving cowl at each end of the space, so that

[1] Being portions of a Chadwick Trust lecture delivered at Newcastle-upon-Tyne, Dec. 3rd, 1920.

while impure air escapes at one end pure and fresh air will enter at the other, and a constant circulation be kept up. One of the ventilators should pass through the deck to at least the lower edge of the beams," but it may be remarked here that it would be better to carry the inlet pipe down to near the deck of the space so that fresh air may circulate right through the space. For the tropics means of introducing windsails by some aperture, such as a skylight or hatch being cut in the deck over the living space, are insisted on. The instructions state that when it is proposed to ventilate crew spaces by any system of mechanical ventilation the full plans to scale should be forwarded for the Board's consideration by the surveyor. There is no mention of consultation with a medical officer, but I consider that the advice of a medical officer expert in ship's hygiene should always be taken; such an expert should sit on the Board of Construction of all ships. In the Royal Navy a medical officer of the Medical Director-General's Staff inspects the ventilation of ships under construction, and cooperates with other Departments in dealing with proposed alterations and improvements; but the ideal would be attained if this officer attended the meetings of the Board of Construction before the keel of a ship was laid. The medical officer is nearly always called in too late for his recommendation to be carried out except at enormous expense. I understand that in France the plans of every ship proposed to be built must be submitted to a Board of Construction, which includes "The Director of Public Health." I must, however, insist that until a medical officer has had long experience at sea, whether in the Royal Navy or Mercantile Navy, he is not qualified to give valuable and practicable advice on construction.

Efficient ventilation in merchant ships, whether natural or artificial, is not so difficult as in men-of-war. The main object of the latter is fighting efficiency, and with all the increasingly complicated and necessary machinery it became a very difficult problem. In 1912 a special committee was able to overcome many difficulties; time and experience gained will, we hope, soon solve the remainder.

Essentials necessary: systems employed.—To obtain efficient ventilation three essentials are necessary: (1) the circulation of a sufficiency of fresh air; (2) the distribution of air without creating draughts; and (3) the maintenance of an equable temperature. Three systems are available for artificial ventilation in a ship—the Plenum system, the exhaust system, and the system where these two are combined. In the Royal Navy the Plenum system is now mainly adopted by which air is drawn in from outside, the inlets being placed on the upper deck so that no foul or exhaust air can be sucked into them; it is then forced by powerful electric fans through air trunks to the living spaces. If necessary it can be warmed by use of "thermo-tanks," which consist of a series of steam pipes over which the cold air passes and is so warmed before passing into the trunks; by these mechanical means the temperature of the air can be adjusted to the comfort of the men.

Standard of purity.—In living and working spaces of a ship a high standard of purity of air must be aimed at. In H.M. ships the fans for supply and the air-trunking are designed to provide for the supply and suitable distribution of air at the rate of 50 cubic feet per person per minute, or 3000 cubic feet per hour. In order to obtain this delivery of fresh air to all parts of the space, outlet gratings of fixed expanded steel are placed at regular intervals along the supply trunks, which extend to the farthest part of the space, the trunk end being closed. Inside the trunks straight metal deflectors are placed near these openings; by adjustment of these deflectors a uniform velocity at all parts is obtained, no unpleasant draught being experienced at a distance of 1 foot from the grating even when 100 cubic feet per minute issue from it. When such equality of velocity is obtained after various trials these deflectors are permanently fixed. It has now been definitely settled that in spaces where there are foul odours or gases or vitiated atmosphere the exhaust system is only to be used. This is a useful point for merchant ships carrying dangerous cargoes of coal or oil and should be considered in the construction for the ventilation of holds. Some merchant ships —as, for instance, the *Aquitania*—employ the double or interchangeable system of supply and exhaust; but the latter is open to the criticism that the exhaust trunks accumulate dust and dirt, which if the exhaust be reversed into supply is blown into the compartment again. It is, however, in smaller ships that the problem of ventilation is so urgent. The Board of Trade instructions only deal with the rudiments of the problem; cowl ventilators (inlet and outlet) frequently have to be closed during bad weather, ventilation then ceasing to exist. Dr. William Hanna, of Liverpool, has rightly advocated the adoption of an electric fan, running at two speeds, fast and slow, and driving air into a shaft which would be carried into and around the quarters at a lower level than the bunks. The shaft is perforated with numerous small holes to admit air into the forecastle. I must emphasise this point. No seaman, naval or mercantile, will stand a draught, and no draught would be experienced if the velocity were not more than 3 feet per second; outlet shafts should be fixed in suitable positions.

Some system of warming the fresh air-supply is necessary; the temperature to be aimed at is about 55° to 60° F.—higher than which it tends to produce dryness of the nose and throat, headache, and fatigue. In H.M. ships the fresh air is heated by being driven through thermo-tanks containing tubes through which steam passes at low pressure. A by-pass is fitted to allow supply of cold air when required; if well regulated its effect will be to prevent excessive moisture and excessive dryness. This method would only be practicable in the larger merchant ships; some system of radiators, electric or steam, should therefore be provided. For cubicles, cabins, and small living spaces an ordinary electric table fan of the traversing type will do much to remove "stuffiness."

Inspection.—Merchant ships carrying medical officers should have a system of inspection of ventilating arrangements, samples of air being taken from time to time with observations on the wet and dry bulb thermometer of the outside and inside air for comparisons; these samples should be sent for analysis. The standard of purity of air laid down in H.M. ships is that there shall be in a living space not more than 12 parts of carbonic acid gas to 10,000 parts of air.

Accommodation.

This subject has aroused perhaps the greatest controversy among all the problems concerning the merchant service. The Merchant Shipping Act at present in force lays down that each man shall have 120 cubic feet air space and 15 square feet floor space. The Act says space occupied by messrooms, bathrooms, or washing places appropriated to the use of seamen may be taken into account, so that not less than 72 cubic feet and 12 square feet is obtained for each man. This should be "over all," that is to say, not counting in space filled up by fixtures. The Australian Government gives 140 cubic feet and 18 square feet; the Norwegian Government gives 125 cubic feet and 18 square feet, exclusive of fixtures, cupboards, &c. In the Royal Navy 200 cubic feet are allowed per man, but this is where hammock-slinging is general. The merchant seaman appears to wish for the "bunk or berth system" for sleeping. The main objection to this system is that it is seldom feasible to provide a separate bunk for each man; a bunk is usually occupied by different men in various watches—an objectionable habit and likely to lead to spread of infectious and contagious diseases. Hammocks, one for each man, are much more hygienic; they are stowed away when not in use, space for day living and messing being thus opened up. The bedding is more easily inspected and each man is responsible for the cleanliness of his own. I feel sure the general adoption of hammocks will lead to better health and comfort. I understand the cubicle system is asked for, with iron bunks; the latter proviso is agreed to, as wooden bunks harbour vermin; but iron bunks, if adopted, should be made to fold up when not in use, especially where no separate messing space is allowed for.

Living space forward or aft.—As regards the placing forward or aft of living spaces for men it is stated that the forecastle position is exposed to storm, danger through collision, cessation of ventilation in bad weather, and noise, which in head seas interferes with sleep. On the other hand, the seaman is much less overlooked "for'ard" and can lead his own life; in hot and calm weather the forecastle is in a favourable position; the best place on board in a collision is governed by chance; and the commanding officer prefers his men for'ard as being more under control in case of accidents. Aft, the noise of the propellers is trying and "bumping" still occurs in heavy seas. On the whole, the aft position is perhaps better; it was lately adopted in H.M. ships, but was not popular with the men, although many officers preferred it. But this comparison hardly holds on account of different structure. On the subject of hammock-slinging it is interesting to note that recently an inquiry was held by the Ministry of Transport and Shipping in conjunction with the Admiralty and War Office on the evil effects of spacing hammocks too near each other in H.M. transports. This spacing was formerly 16 inches between each hammock hook; in the Royal Navy it has now been increased to 20 inches. The evils of such close approximation in transports were revealed in their overcrowded state during the war; influenza spread to an alarming extent and mortality was high. In future hammock hooks will be fitted 27 inches apart, centre to centre, instead of 16 inches, and the interlocking of the hammocks will be increased from 3 feet to 4 feet 6 inches. Troops will be embarked up to the extent of the hammock billets provided, plus 25 per cent. in addition. By the new method of slinging no two heads of people in adjacent hammocks are opposite. The 25 per cent. troops for whom no hammock billets are provided will be employed on various duties (sentries and watch-keepers) whilst the remainder are sleeping.

General accommodation.—On the subject of general accommodation in merchant ships I recommend for your perusal the February, 1920, publication of *Blackwood's Magazine*, which contains the impressions of a naval officer on first taking over command of a merchant ship for war service. It is satisfactory to note that the merchant seamen gladly adopted the disciplinary measures which were made for their comfort. This shows how much can be done to improve living conditions by officers of a ship provided they have the necessary knowledge and tact. Much more, however, could be done if ship-owners and ship-builders would make every effort to improve sanitary conditions, thereby making the men more contented and getting better work from them. This is evidenced in the new standard ships. Here the crew are placed in the after-part of the ship, which is steam-heated. Messing space is separated from the sleeping space; a recreation- and smoke-room is provided; cubic and floor space is more than is laid down by the Board of Trade. Separate cubicles, each fitted with two berths, are placed along the ship's side. The men wish them placed against the bulk-heads, but I think the former is the better arrangement. Seamen and firemen's wash-places are provided and have lockers for each man's dirty clothing. I think the adoption of spray-baths would be a further great improvement, saving water and time and meaning that no man can wash in the same water another has used. These improvements have their origin in the demands made by the National Seamen's and Firemen's Union.

THE NATURE OF ANIMAL LIGHT.

WITHOUT discussing the ultimate nature of light—whether it is due to a succession of pulse-waves in the ether caused by vibrations of electrons or to other causes—there are aspects of the question, more especially bio-luminescence or bio-photogenesis—the production of light by animals and plants—which have in all ages excited the interest and curiosity of mankind. Professor E. Newton Harvey, of Princeton University, has published a most interesting monograph—one of the series of "Monographs on Experimental Biology"—on the "Nature of Animal Light."[1] The memoir is concerned largely with the physical characteristics of animal light and the chemical processes underlying its production. Recent researches go far to place this question on a sound physico-chemical basis. That animals can produce light was recognised in the earliest times, when fire-flies and glow-worms abounded and the phosphorescence or "burning of the sea" was described by the older explorers. Aristotle mentions the light emitted by dead fish and flesh and some kinds of damp wood—phenomena now proved to be due to living micro-organisms.

Bio-luminescent Animals and Plants.

In 1667 Robert Boyle, by means of his receiver and pump, made fundamental experiments to show that the light from all three sources, as well as that of the glow-worm, is dependent on a plentiful supply of air, and drew an interesting comparison between the light of the luminous wood and a glowing coal. Of course, Boyle knew nothing of oxygen, the essential factor in his experiments. Some material is oxidised; its nature and the production of the light which accompanies oxidation are the two fundamental problems in bio-luminescence. At least 36 orders of the animal kingdom contain one or more forms that produce light; in the plant kingdom only two groups contain luminous forms—some of the bacteria and some fungi, especially certain mushrooms—either the mycelium alone or the fruiting body alone, or both, are luminescent. Amongst animals, noctiluca, jelly-fish, ctenophores, sea-pens, some marine worms, various crustaceans, brittle stars, fire-flies and their larvæ, and glow-worms, a few molluscs—e.g., *Pholas* and *Pyrosoma*—and some fishes. All these are either marine or terrestrial; no examples of fresh-water luminous organisms are known. Most marine forms are deep-sea animals, some of them—fishes with complicated luminous organs, and many luminous marine animals—are surface forms of the plankton. The eggs of the *Lampyris* beetle emit light, even within the ovary. The only safe way to detect luminous organisms in sea-water is to add a little ammonia to the water, which slowly kills the organisms and causes any luminous forms to glow with a steady, continuous light for a time, a condition accompanying the death of the animal, a sort of "death-glow," to be compared, perhaps, with rigor mortis in muscle tissue. Of course, many non-luminous forms and—before the days of antisepticisms—even human wounds were infected with luminous bacteria, so that such luminescence is purely secondary. The supposed luminous character of the eyes of the cat in the dark is purely a phenomenon due to reflection out of the eye again of light which has entered from some external source. The eye of any animal is quite invisible in absolute darkness, and the same applies to the so-called luminous moss *Schistostega*. Luminous bacteria are very sensitive to oxygen, and "bacterial lamps" have been prepared and photographs taken by Raphael Dubois and also by Molisch, but it "seems doubtful, to say the least, whether luminous bacteria can ever be used for illumination."

"Cold Light" and Oxidation.

The ordinary forms of light to which we are most accustomed—sunlight, electric light, gas-light—are in each case parallel phenomena with the high temperature of the sources—bodies in a state of incandescence, emitting radiant energy or flux of many different wave-lengths, heat-light, and actinic rays, as well as other varieties of rays. But many bodies give off light at low temperatures and when stimulated by some other means than heat. Such bodies are spoken of as luminescent by the Leipzig physicist, Wiedemann, and to this category belong all luminous animals. Luminescences are classified according to the means of exciting the light—thermo-, photo-, cathodo-, radio-, chemi-luminescence, and so forth. They are all examples of "cold light," light produced at temperatures far below those observed in incandescent solids. Organo-luminescence, or the light of luminous animals, is in no sense phosphorescence, being quite independent of previous illumination of the animal; indeed, strong light has a bactericidal action on these forms, similar to that with ordinary bacteria. The spectra of luminous animals are quite similar to those of chemi-luminescent reactions, and this is essentially an oxy-luminescence, since oxygen is necessary for the reaction. All luminous animals require oxygen for light production, so that bio-luminescence and chemi-luminescence are similar phenomena, and the light of luminous animals is due to the oxidation of some substance produced in certain of their cells.

Physical Characteristics of Animal Light.

The characteristics of the physical nature of animal light—quality, efficiency, and intensity—have only been accurately measured in one group—the beetles. Very few organisms produce light to the fully light-adapted eye, although their light may seem quite bright to the dark-adapted eye, but the dark-adapted eye is a poor judge of the quality—i.e., the colour of a light—due to the Purkinje phenomenon, for "all cats are grey in the dark." Different luminous animals produce light of quite different colours as judged by our eye, and some animals possess several luminous organs emitting different colours—some two, some three colours—but this difference of the light does not necessarily indicate difference in spectral composition, because of the Purkinje effect. Examination of the spectrum of various luminous forms clearly indicates, however, that the different colours are really due to light rays of different wave-length, and are not the result of any subjective phenomenon. The spectrum of luminous animals never extends to the limits of the visible spectrum in either the red or violet, although it is possible that bands occur in the infra-red or ultra-violet; the radiation from the fire-fly is 100 per cent. efficient; it is a "cold light"; its energy is all light and no heat. The most efficient artificial illuminant has only about 4 per cent. of the luminous efficiency of the fire-fly. Luminous bacteria glow with less intensity than any other organism, and A. Lode calculated that the dome of St. Peter's at Rome, if covered with bacteria, would give little more light than a common stearine candle, so that luminous bacteria are not likely to come into vogue for purposes of illumination. Light from animal sources in no way differs from ordinary light except in intensity and spectral extent. It is all visible light, with no infra-red or ultra-violet radiation or rays capable of penetrating opaque objects. It may be polarised, can cause fluorescence or phosphorescence of substances, affect a photographic plate, cause heliotropism of seedlings, and stimulate the formation of chlorophyll.

Luminous Organs.

As to the luminous organs themselves, in one class the oxidisable material is formed and burned within the cell—intracellular luminescence; in the other the material is secreted to the exterior and is burned outside—extra-cellular luminescence. Some animals have very complicated luminous organs—in which chemical energy is converted into radiant energy—the lantern of the fire-fly and other animals is an organ of chemi-photo changes, while eyes which receive light are organs of photo-chemical changes. In some organisms the oxidation of luminous material goes on continuously independent of any stimulation of the organism—e.g., bacteria, fungi, and a few fish—or is intermittent, oxidation and luminescence occurring only as a result of stimulating which may occur from within (e.g., from nerves) or without. The flashing excited by stimulation has a varied rhythm in different animals, and different species of fire-fly can be distinguished by the character of their flashing. Some forms produce light

[1] The Nature of Animal Light. By E. Newton Harvey, Ph.D., Professor of Physiology, Princeton University. Monographs on Experimental Biology. London and Philadelphia: J. B. Lippincott Company. 1920.

only at certain seasons of the year, and some have a periodicity of luminescence—e.g., at night—failing to respond during the day. The photogenic material is formed within the cells or in glands, and in some forms is associated with granules in the protoplasm. As to the chemistry of light-production R. Dubois experimented with *Pyrophorus* and *Pholas* and Newton Harvey with other forms, including a *Cypridinia*, an ostracod crustacean.

Luciferine and Luciferase.

The net result is that luminescence in these three forms is definitely shown to be due to the interaction of two easily separable substances, luciferin and luciferase, in presence of water and oxygen; but luciferin and luciferase from different luminous animals have different properties, and are to be distinguished by prefixing the generic name of the animal from which they are obtained. Luciferase has protein properties, is capable of oxidising large quantities of luciferin, behaves in many ways as a ferment, and may be so regarded. One of the most remarkable things concerning luminescence in general is the small amount of material necessary to cause a visible emission of light. A flash of light resulting from the impact on ZnS of a single α particle, a helium atom, is visible to the naked eye. Luciferin and luciferase from *Cypridinia* will also luminesce in exceedingly small concentration. One part of luciferase in 1,700,000,000 parts of water will give light when luciferin is added, and a similar dilution of luciferin will give light when luciferase is added; so great is the sensitivity of our eye in the detection of a small energy change. Luciferase seems to act as an organic catalyst, oxidising luciferin with light production; the reaction begins with an extraordinarily low oxygen tension, increasing in intensity with the increase of that oxygen tension, but very soon a maximum luminescence is obtained, and further increase of oxygen-tension gives no brighter light; the oxygen-tension curve is very similar to the hæmoglobin-saturation oxygen-tension curve. For a given mixture of luciferin and luciferase of *Cypridinia* the light becomes more intense, with increasing temperature up to a definite optimum, and then diminishes in intensity. A minimum, optimum, and maximum temperature for luminescence is observed in all luminous organisms. Luminous bacteria will still light at −11·5° C., nor is the power of luminescence destroyed by exposure to liquid air. The intensity of luminescence seems to be dependent on the velocity of oxidation of luciferin, and perhaps also on the particular manner in which luciferin is oxidised. We may assume as a tentative hypothesis that luminescence only occurs during oxidation (addition of O or removal of H) of the luciferin-luciferase compound.

PUBLIC HEALTH IN EGYPT.

Lower Egypt, 1918.[1]

THE Annual Return of Births, Deaths, and Infectious Diseases in Egypt during 1918, issued by the Statistical Department of the Ministry of Finance, has already been noticed in these pages (THE LANCET, August 7th, 1920, p. 331). The Report of the Public Health Department has now been issued, and contains much additional matter of interest; it relates to the calendar year 1918, with the exception of financial details, which refer to the financial year, ending March 31st, 1919. The population of the whole country, calculated for July 1st, 1918, is now stated as 12,820,900, as compared with 12,662,700 in the year preceding. The general birth-rate was 39·5 per 1000, as compared with 40·6 in 1917; the death-rate was 39·9, compared with 29·7. Ismailia, on the Suez Canal, had high birth and death-rates (88·0 and 624·1), owing to the presence of a large temporary population, both civil and military, whose births and deaths were calculated against the normal civil population. In the sparsely populated province of Sinai there was also a high birth-rate (51·1) and death-rate (795·4), for the same reason. The Eastern Desert Province had 3·7 births and 9·7 deaths per 1000. With these exceptions the birth ratios ranged from 31·5 at Aswân and 33·8 at Suez to 42·9 in the Fayûm and 44·9 at Asyût; in Cairo and Alexandria (the two largest cities) the ratios were nearly the same (36·9 and 36·7). Influenza made its first appearance in the country at Alexandria in May, having been imported from Europe by sea. In June it was recognised at Port Said, at Cairo in July, and in August in the province of Daqahliya, in the east of the Delta. Scattered outbreaks with a high rate of pulmonary complication and high death-rates occurred in other provinces, both of Lower and Upper Egypt in September, and in October it spread quickly over the whole country, with much pulmonary complication and corresponding high fatality. It reached its zenith in the first week of December. "The disease was certainly introduced from Europe by sea," and was prevalent in the British Army both in Egypt and Palestine before extending to the civil population. "The great majority of the 4059 towns and villages of Egypt were attacked," the spread of the disease being promoted by the frequent fairs held in the country villages and by military movements, but not by the Mecca pilgrimage. The total number of cases is not known, but the excess of deaths from September to December inclusive over the average of that period for 1916 and 1917, amounting to 138,648, may be presumed as roughly the total number of deaths due to this disease. Circulars as to personal precautions and immediate preventive measures were widely distributed, medical aid was organised, funeral celebrations stopped, and numerous special influenza hospitals opened in the districts most affected. In the treatment of cases with pulmonary complication cacodylate of guaiacol is considered to have given the best results. There were increases in relapsing and typhus fever notifications, but many of these were really cases of influenza. There were 357 "declared cases" of plague (with a fatality of 42·8 per cent.), compared with 732 cases in 1917, and 1702 in 1916. Owing to the invasion of Palestine in 1917 Egyptian troops and labourers were exposed to cholera infection, and several cases were detected in December of that year among men returning to Egypt. Five days quarantine and disinfection were imposed on all Egyptian levies at Kantara and Port Said before entering Egypt. Of 280,044 men so returning to the country 96·9 per cent. were kept under observation; prisoners of war were segregated, and instruction given in preventive measures, with practical training, at various centres throughout the country. The result was that no cholera was introduced into Egypt, which means that, in all probability, Europe was saved from a visitation of this pestilence.

Full and precise details are given of the work carried on in the Public Health Laboratories, the Vaccine and the Antirabic Institutes, showing that the Egyptian administration fully recognises the great value of scientific preventive medicine, and appreciates the material benefit to the country and its inhabitants derived therefrom. Colonel Cathcart Garner, Director-General of the Department, is to be congratulated on the results recorded. The immense advance in the public health (and the prosperity) of Egypt can perhaps only be fully appreciated by those of an older generation whose knowledge of the country dates back to the early eighties of last century.

Sudan, 1914–19.

In a report on the affairs of the Sudan, covering the years 1914–19, the Governor-General, Major-General Sir Lee Stack, makes several references to medical matters. He says that in 1915 a reorganisation of the medical work of the Sudan was carried out with the creation, under its own director, of an independent civil medical department, which had previously been under the control of the Principal Medical Officer, Egyptian Army. A new system of regulation of births and deaths has been instituted, which has resulted in a considerable increase in the number of registrations, as shown by the following figures:—

	1914.	*1915.*	*1916.*	*1917.*	*1918.*
Births	16,645	12,318	15,303	14,078	18,935
Deaths	12,450	16,065	9,587	9,172	14,452

These figures do not approach completeness or accuracy, as appears from the fact that the estimates of population from other sources give a total of over 4,000,000, as against 3,400,000 in 1914; but the system of registration does not obtain at all in the Southern Sudan. Seven outbreaks of cerebro-spinal fever occurred in 1914–15 with a heavy mortality. As regards small-pox, the Northern Sudan is fairly efficiently protected by vaccination. Small outbreaks occurred in Khartoum and Omdurman in 1917, but were soon controlled. Vaccinating tours arranged as far as possible during the winter months, but have had to be curtailed owing to shortage of staff. Considerable success has recently been obtained in vaccinating among nomad Arabs, who had previously been strongly opposed to it.

In 1918 the Sleeping Sickness Commission was considered to have completed the duties for which it was appointed, and its advisory functions were taken over by the Central Sanitary Board, the executive work being continued by the Principal Medical Officer of the Egyptian Army. In the Yei River district of the Mongalla Province about 175 patients, who had been three years from symptoms, were discharged as cured. In the last year progress has been made in the infected areas dealt with, and no new areas of human trypanosomi infection have been discovered. The P.M.O. of the Egyptian Army has forwarded the reports of Captains Spence and Simpson, R.A.M.C., on their several districts, and pays a deserved tribute to the patient steady work which these two officers and their Egyptian and Syrian staff are doing. The influenza epidemic made its appearance in the Sudan in September, 1918. It became very general throughout the Sudan, with a considerable mortality. The district which suffered the most appears to have been Berber province, north of Khartoum.

[1] Annual Report of the Department of Public Health, Cairo: Government Press, 1920.

It reached its most virulent stage in February, 1919, and died away in April and May. It is not possible to give more than an approximate estimate of the extent of the outbreak and consequent mortality. The senior M.O., Kassala, estimated 1600 cases out of a population of 6000 in Gedaref alone; 35 deaths from the disease were notified. The death-rate of all cases admitted to hospital was about 6 per cent. Malaria on the whole was not severe, except at Makwar, in the Sennar province, where the Blue Nile dam is to be constructed. Much work is being done in continuing the antimony treatment of bilharzia, first fully investigated and developed by Dr. J. B. Christopherson, the Director of the Khartoum and Omdurman Civil Hospitals. This officer, who has done valuable work for many years, retired on pension in May, 1919.

Dr. E. S. Crispin, the Director of the Medical Department, reports that considerable difficulty is still experienced in respect of both staff and hospital requirements. Advertisements for medical inspectors produced few replies and there has been a similar difficulty in obtaining Syrian and Egyptian staff. Funds were provided this year for a maternity school. The buildings are being constructed.

THE "BEE WORLD."

BEEKEEPERS will be interested in the *Bee World*, an international journal "devoted to the progressive interests of modern bee culture" (Apis Club, Port Hill House, Benson, Oxon). The 1920 June-September number contains much evidence of the enthusiastic support given to the journal by those who labour in this exacting industry, and includes an interesting article on the re-stocking with bees of the devastated areas of France and Belgium by the War Victims' Relief Mission of the English and American Society of Friends.

THE GIRLS' SCHOOL YEAR-BOOK.

THE official organ of reference of the Association of Head Mistresses, in its fifteenth annual edition (1920-1921), besides an alphabetical list of schools with the names of governing bodies and staffs, contains all details of fees, school courses, hours of attendance, and so forth, and indicates the various professional and business openings available for girls after leaving school. The articles on medical education for women, and on dentistry, pharmacy, nursing, massage, health visitors, sanitary inspectors, and the like, though short, are explicitly written and are of practical use to parents, guardians, and pupils. Lists of scholarships gained by women during 1919 and university honour degrees, 1919, are among the other contents of this useful book of reference, which is published by the Year-Book Press, 13, Museum-street, London, W.C. 1, price 7*s.* 6*d.*

A RADIANT HEAT CONSERVER.

IT is estimated that some 30 per cent. of the radiant energy of a fire is directed to the floor in front of that fire, where its heat is taken up by the floor-door draught. Mr. C. Wray, F.R.C.S. Eng., has invented a device whereby this difficulty may be overcome, consisting of a horizontal brass tray on telescopic legs with vertical wings on the right and left borders, so arranged that they can be adjusted to different widths of fire. The general effect is practically to bring the fire 18 inches forward into the room; as heat diminishes as the square of the distance the advantage of this fact is obvious. The right wing reflects heat to the left of the room, the left wing to the right of the room; the two combined protect the incandescence from draught. When this heater is used with a good gas-stove there is no occasion to light the fire more than three minutes before making use of a room. A kettle or an entire meal can be kept at boiling point, and the heater proves ideal for toasting purposes; it is also useful for rapid drying of instruments and clothes. It is manufactured by Messrs. Gowlland, Morland-road, Croydon.

"HOW TO LIVE FOR MORE THAN ONE HUNDRED YEARS."

Mr. L. H. Goizet, the author of "Never Grow Old" (London and New York: G. P. Putnam's Sons. 1920. Pp. 191. 10*s.*) states that "chemistry teaches us that the composition of the organised being reduces itself to four gases, azote, oxygen, hydrogen, and carbon, and to a few mineral principles of earthly origin. Since the gases are elastic—that is, able to be compressed or dilated—the form [of the body] must be likewise." If the gases are not "maintained in a sufficient state of cohesion and compression by the universal rotatory movement" they dilate, "and the separation of the form commences, to be continued more or less rapidly in a complete way to total vanishing," which lamentable result can be postponed for a long time by the author's system of superficial tractile rotatory rubbings beginning "at the centre of gravity of the form which corresponds exteriorly to the crown of the head." It is difficult to understand how such nonsense came to be printed.

MEDICAL PRACTICE BY FOREIGNERS IN SPAIN.

THE position of foreigners who desire to practise medicine in Spain has long been obscure, and we are glad to be able to give categoric information on certain points, thanks to the courtesy of the Registrar of the General Medical Council. All foreign subjects, it appears, may carry on their respective professions in Spain, except such callings as imply the use of authority or jurisdiction, provided that they have studied and been approved like a Spaniard in official Spanish educational establishments. Actual medical reciprocity only exists with some American Republics, and with Portugal, but foreigners who prove the validity of their qualifications and have practised for six years are admitted, the right of refusing recognition being reserved.

In a specific case the following information was supplied: The candidate must present an academic certificate, giving details of all courses of study, which must be issued by the head of the University or other authority under whom the studies were carried on. This must be authenticated by the Minister of Education, and his signature must be verified by the Foreign Minister in England. This in its turn must be authenticated by the Minister for Foreign Affairs in Madrid. The application must then be reported upon by the College of Medicine and the Council for Public Instruction in Spain. This information will be incorporated in a new edition of the pamphlet on the conditions of practice abroad, shortly to be issued by the General Medical Council.

YEAR BOOK OF PHARMACY.

THE 1920 volume (London: J. and A. Churchill. Pp. 594) contains the usual abstracts of papers relating to pharmacy, materia medica, and chemistry, contributed to British and foreign journals during the year ending June 30th last. This part has been well done by Mr. J. O. Braithwaite. The list of new remedies and of new applications of old remedies is compiled by Mr. Thos. Stephenson, F.R.S. Edin. A novel and useful feature is a "research list" or enumeration of subjects suggested for research, for which grants may be made by the British Pharmaceutical Conference. Finally, the transactions of the Conference held at Liverpool last July are given in full, including Mr. C. A. Hill's valuable address on Progress in Science and Pharmacy, comment upon which appeared at the time in our columns.

Communications, Letters, &c., to the Editor have been received from—

A.—American Medical Association, Chicago; Andiron Club of New York City.
B.—Prof. A. E. Boycott, Lond.; Dr. H. C. Brown, Lond.; Mr. H. J. Buckland, Lond.; Dr. C. Bolduan, Washington.
C.—Dr. H. P. Cholmeley, Forest Row; Dr. G. Chaikin, Lond.; Prof. E. L. Collis, Cardiff; Clerical, Medical, and General Life Insurance Society, Lond.; Cardiff Medical Society, Hon. Sec. of.
E.—Prof. J. T. Edwards, Lond.; Mr. G. Evans, Lond.; Eugenics Education Society, Lond.
F.—Mr. H. A. T. Fairbank, Lond.; Dr. C. O. Fowler, Lond.
G.—General Medical Council, Lond., Registrar of; Sir H. J. Gauvain, Lond.; Dr. W. H. Gregory, Beverley; Great Northern Hospital, Lond.; Mr. F. B. Galbraith, Montclair; Dr. L. H. Guest, Lond.
H.—Prof. F. G. Hopkins, Cambridge; Sir W. P. Herringham, Lond.; Dr. T. S. Higgins, Lond.; Hospital Library and Service Bureau, Chicago; Dr. W. Harris, Lond.
I.—Mr. J. Ingham, Bradford.
J.—Major J. P. Johnson, S.A.M.C., Lond.
K.—King Edward VII. National Memorial Association, Cardiff; Dr. W. H. Kesteven, Lond.
M.—Ministry of Health, Lond.; Metropolitan Asylums Board, Lond.; Medical Institution, Liverpool; Medical Defence Union, Lond.; Dr. J. C. Muir, Lond.; Dr. J. F. McMillan, Sandown; Dr. R. J. Morris, Harrogate; Dr. R. Miller, Lond.; Dr. G. Marshall, Lond.
N.—National League for Health, Maternity, and Child Welfare, Lond.
P.—Dr. R. H. A. Plimmer, Aberdeen; Pastel Society, Lond.; People's League of Health, Lond.; Dr. S. Phillips, Lond.; Capt. V. Perez, R.A.M.C., Farnborough; Professional and Business Women's Hospital League, Lond., Sec. of.
R.—Dr. B. Robinson, New York; Mr. R. P. Rowlands, Lond.; Royal Surgical Aid Society, Lond.; Royal Mail Steam Packet Co., Lond., Chairman and Directors of; Royal Medical Benevolent Fund, Lond., Sec. of; Royal Institution of Great Britain, Lond.; Dr. F. A. Richmond, Lond.; Dr. F. Roberts, Cambridge.
S.—Dr. W. J. E. Sumpter, Sheringham; Messrs. Southall Bros. and Barclay, Birmingham; Dr. G. F. Stebbing, Lond.; Society of Medical Officers of Health, Lond., President of; Mr. J. D. Spencer, Aberystwyth; Dr. H. Scurfield, Sheffield; Societe des Sciences Medicales et Biologiques de Montpellier; Prof. W. Stirling, Manchester.
T.—Dr. A. H. Thompson, Lond.; Dr. H. M. Turnbull, Lond.; Dr. G. L. Thornton, Exmouth; Dr. Thaysen, Copenhagen.
U.—University of St. Andrews.
W.—Dr. F. Parkes Weber, Lond.; West London Post-Graduate College; Dr. P. Wilde, Bath; War Emergency Fund, Lond.
Y.—Dr. M. L. Young, Lond.

Communications relating to the editorial business should be addressed exclusively to the Editor of THE LANCET, 423, Strand, London, W.C. 2.